QUESTIONING DEVELOPMENT: GLOBAL INTEGRATION AND THE CARBON INTENSITY OF WELL-BEING

by

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A dissertation submitted to the faculty of
The University of Utah
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Sociology

The University of Utah

December 2014

The University of Utah Graduate School

STATEMENT OF DISSERTATION APPROVAL

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ABSTRACT

I investigate the extent to which sociological theories of global integration help explain variation in countries' carbon intensity of well-begin (CIWB) over time. The CIWB approach provides a way to simultaneously measure a country's sustainability in terms of both environmental and human well-being. This is a burgeoning area of inquiry with much focus on the role of economic development; yet, looking at the effects of other aspects of global integration is relatively unexplored for the CIWB. I evaluate complementary theoretical propositions drawn from neoinstitutional world society / world polity theory and from the political economic theory of ecologically unequal exchange. I utilize statistically rigorous longitudinal modeling techniques to analyze data from 81 countries for the period from 1990 to 2011. I also look at subsets of more and less developed countries and compare production and consumption based measures of the CIWB when applicable. With this project I address core sociological issues of inequality, human well-being, and development, I explore areas of inquiry in environmental sociology related to sustainability and the production of carbon dioxide emissions, and I test theoretically derived hypotheses from comparative international sociology. I find world society / world polity integration is only associated with a reduction in the CIWB in more developed nations, and only when using the production measure for CO2 emissions. In less developed countries this form of integration is associated with an increasing CIWB. I find that while the main effect of economic integration is to reduce

the CIWB of nations over time, this relationship is becoming less negative with time, especially for less developed countries, even becoming positive in the later years of the analysis indicating economic integration is beginning to increase the CIWB in some less developed countries. In terms of ecologically unequal relations of exchange I find evidence to support this theoretical perspective, especially at certain points in time, for less developed countries as the theory suggests. This research aims to contribute to a better understanding of the complexities of global sustainability in an unequal global system.

For Marshal and my parents, thank you for everything.

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ACKNOWLEDGEMENTS

This dissertation would not exist if it were not for the guidance of Andrew Jorgenson. Andrew has been an incredibly generous and kind mentor during my time at the University of Utah and it is hard to overstate his role in my development as a sociologist. I admire his work and work ethic, I admire him as a person, and I am tremendously lucky to count him as both advisor and friend. I would also like to take this opportunity to thank the other members of my committee. I have learned so much about environmental sociology from Brett Clark, and I also hope there are more vegan food tours in our future. Wade Cole has provided many opportunities for intellectual advancement, including sharing data and inviting me to present an early version of this project at Stanford University at a conference on world society theory. Ming Wen and Mike Timberlake have always been supportive and encouraging, and I have always felt that they were looking out for me, something I greatly appreciated. I specifically want to thank Tabitha Benney for the email she sent Andrew, which he forwarded to me, which provided much needed encouragement when I was in the final weeks of preparing this dissertation. I am also appreciative of the university and departmental funding opportunities that allowed me to attend many conferences as a graduate student, including a grant from the Global Change and Sustainability Center at the University of Utah which allowed me to present research from this dissertation as I was finishing it, and where I was able to meet with many of the scholars whose work is referenced in this project. More generally I would like to thank everyone, from students to faculty to staff, in the Department of Sociology and in the Environmental Studies Program at the University of Utah for creating an environment conducive to intellectual inquiry and collegiality. I have thoroughly enjoyed my time here; thank you.

CHAPTER 1

INTRODUCTION

A new round of sustainable development goals (SDGs) are scheduled to replace the Millennium Development Goals (MDGs) beginning in 2015. This is just one indicator that we live in a time of awareness of environmental change, the causes and consequences of which are global (Rockstrom et al. 2009a, 2009b) and unequal (Jorgenson and Clark 2012; Roberts and Parks 2007a). Conceptualizing sustainability at the global scale in a way that allows measurement and study over time is one step toward addressing these issues. Sustainability research must take into account both human and environmental outcomes and must lead us to a better understanding of relationships between human and natural systems (Liu et al. 2007a, 2007b).

The carbon intensity of well-being (CIWB) is a concept that simultaneously captures human and environmental sustainability (Dietz, Rosa, and York 2009, 2012; Jorgenson 2014; Jorgenson and Dietz 2014) and relationships between human well-being and the stress humans, often in the pursuit of well-being, can put on the environment (Dietz and Jorgenson 2014; Lamb et al. 2014; Steinberger and Roberts 2010; Steinberger et al. 2012).

In this project I analyze the CIWB of 81 countries from 1990 to 2011 using Prais-Winsten models with panel-corrected errors and an AR1 (first-order autoregressive) correction, and I control for period and country specific effects, the equivalent of two-way fixed effects models. All variables in the model are logged, thus I estimate elasticity coefficients. I estimate models for all of the countries and I also estimate models for smaller samples of high and nonhigh income countries, in addition to several other groupings including a group of OECD countries (Organization for Economic Cooperation and Development) and a group of 16 countries with the lowest CIWB. Countries with especially low CIWBs are said to fall into the Goldemberg corner (Goldemberg et al. 1985; Lamb et al. 2014; Steinberger and Roberts 2010; Steinberger et al. 2012). Figure 1 depicts where countries could potentially fall on the CIWB spectrum, from low life expectancy and low emission in the lower left, to high life expectancy but low emissions in the upper left, the Goldemberg corner, where all countries would need to fall if we hope to achieve global sustainability and equity, to the upper right with countries with high life expectancy but high emissions. Figure 2 presents a scatter plot of the position of countries included in my analyses on the CIWB composed of life expectancy and production-based CO2 emissions for the year 2010. Figure 3 graphically depicts the change over time, from 1990 to 2011 of the CIWB of the 81 countries, separated into four overlapping groups. I look at the CIWB constructed from both production and consumption measures of carbon emissions when applicable. In line with previous research, I conceptualize well-being as life expectancy but I also include an analysis using infant mortality as a measure of well-being. Figures 4, 5, and 6 graphically represent the CIWBs for ten selected countries representing different levels of CIWB from high, in other words problematic (e.g., U.S. and Malawi) to low, i.e., desirable (e.g., Costa Rica), from 1990 to 2011, for each of the three constructions of the CIWB discussed in this dissertation. Figure 4 portrays a CIWB using production-based CO2 emissions and life expectancy, Figure 5 portrays a CIWB using production-based CO2 emissions and infant survival, and Figure 6 portrays a CIWB using consumption based CO2 and life expectancy. Most research that looks at change over time in the CIWB of nations looks at the role of economic growth; in this project I draw upon insights from macrocomparative sociology.

A key insight from comparative international (Chase-Dunn 1975, 1998; Chase-Dunn and Jorgenson 2007; Chase-Dunn, Kawano, and Brewer 2000; Jorgenson 2009b 2009c; Jorgenson and Clark 2011; Jorgenson and Kick 2006; Mahutga and Smith 2011; Roberts 2004; Wallerstein 1974, 2000, 2005, 2006) or global and transnational sociology (Boli, Ramirez, and Meyer 1985; Boli and Thomas 1997; Krucken and Drori 2009; Meyer et al. 1997a) is that global forces shape within nation-state conditions. Nation-states are embedded in a global system. States are seen as having responsibility, to varying degrees, of producing well-being for their citizens, and their position in the system is one factor that affects their ability to do this. Likewise national level policies and strategies regarding the environment and environmentally friendly or damaging political and economic decisions are made in the context of the international system. Furthermore, decisions in both areas can have ramifications on the other area, creating feedback loops.

Understanding how patterns of global integration matter for this measure of sustainable development helps us to better understand the importance of inequalities in the global system, effective integration strategies of countries, and how the system functions as a whole; all of this is vital to understand in order to implement effective evidence-based policies that enable working toward effective sustainable development.

Additionally, cognizance of our global economic system and issues of international relations and global competition, shed light on why questioning the growth paradigm in light of environmental problems is met with so much resistance (Schnaiberg, Pellow, and Weinberg 2002). Sociological neoinstitutional world polity and world society theories and the political economic theory of ecologically unequal exchange yield theoretically derived hypotheses that can be used to attempt to explain how global integration affects change over time in the CIWB of nations-states. Environmental problems exist on multiple scales, but ultimately we must address environmental problems such as climate change, at least in part, at the global scale; thus, understanding how global integration matters is key to understanding both the development and environmental problems we face and potential solutions.

Neoinstitutional world society or world polity theory is an important theoretical perspective when considering globalization and global integration. The cultural values of the world society / polity are identified as universalism, individualism, voluntaristic authority, rational progress, and world citizenship (Boli and Thomas 1997). Roberts and Grimes (2002) noted the potential of world-systems theory in study of the environment, but claimed it needed to consider culture more seriously. World society / polity theory integrates culture into the study of global environmental change, shedding light on aspects of the political, institutional, and cultural elements of globalization and the environment; it is thus an important theory of global integration. The cultural values espoused by the world society / polity are not necessarily challenging to the global capitalist system and in this way it can be seen as aligned with some of the ideas of (ecological) modernization theory (Mol 2002). The world society / polity theory, however, is a global theory and it is unique in its acknowledgement of and attention to the notion of decoupling between cultural / institutional structures and practices (Meyer et al. 1997a) and in its conceptualization of the role of organizations in global diffusion. World polity research views international nongovernmental organizations (INGOs) as both "reflections of and contributors to" a world culture and world polity network that is not reducible to economic or political interactions (Boli and Thomas 1997:171). Although the cultural values of the world polity are not necessarily challenging to the capitalist world-system, this perspective draws our attention to how individuals and groups are constructed by global forces as actors with agency in the system, and this has enormous mobilizing potential (Meyer 2010). Smith and Wiest (2005) analyze participation in transnational social movement organizations (TSMOs) and find that while connections to the global economy are not significant in explaining movement participation, in less developed countries with strong ties to the world polity citizens are more tied to global activist networks than in countries without strong ties to the world polity. This is but one indication that the links between world polity connection, citizen mobilization, and social change should continue to be empirically explored.

World polity theory also has a tradition of application to the environment. Meyer et al. (1997b) see the rise of a world environmental regime as beginning with INGO association and leading to treaties and intergovernmental organization such as environmental commissions within the UN. Frank, Hironaka, and Schofer (2000a) discuss the importance of top down diffusion of the idea that protection of the environment is a government responsibility and examine various nation-state activities aiming to protect the environment. In a constructive critique, Buttel (2000) raises the question of whether these actions actually make a difference in environmental outcomes. This elicits a clarifying response from Frank, Hironaka and Schofer (2000b) and leads to a stream of research that tests world polity impacts. Such impacts are generally assessed by looking at connections to the world polity as indicated by INGO or EINGO (environmental international nongovernmental organization) presence. Schofer and Hironaka (2005) note the presence of decoupling of national policies and outcomes, and identify circumstances that make this decoupling less likely and thus lead to better environmental outcomes. World polity studies tend to find evidence of the impact of such civil society organizations on environmental outcomes and emphasize the global cultural diffusion that drives such organizing and policy change (Frank, Longhofer, and Schofer 2007). Longhofer and Schofer (2010) find these transnational linkages are especially important in less developed countries. Although they attribute this to the global diffusion of environmentalism, political-economic perspectives on globalization and the environment suggest such linkages are especially necessary to generate outcomes in countries whose citizens are disadvantaged in the global political economy. Political economic perspectives draw attention to structures of exploitation and illustrate the importance of combining both world polity and political-economic theoretical perspectives. Also, more in line with concepts clarified by political-economic approaches, the writing of Agarwal and Narain (1991) complicates this happy view of global diffusion of environmentalism by raising the objection that some Global North environmental movements actually equal a form of imperialism on the Global South. World polity theory helps us attend to global diffusion and devise policy strategies. Agarwal and Narain's (1991) point shows the value of the world polity perspective in conjunction with political economic theories in helping us to keep in mind the exploitative history of the system.

World polity theory is increasingly applied to both environmental and health and well-being topics. Many studies find a beneficial impact of connections to the world polity / presence of EINGOs and INGOs on outcomes such as CO2 emissions, organic water pollution, deforestation and industrial organic water pollution and human health, while controlling for variables derived from political economic perspectives (Jorgenson 2008, 2009a ; Shandra et al. 2004, 2009b, 2009c). Jorgenson, Dick and Shandra (2011: 81) find that while global economic integration contributes to environmental harms, world polity integration has a mitigating impact on deforestation associated with foreign investment. This indicates that "civil society groups and their collective actions at the transnational and global levels are able to mollify—at least to some extent—the environmental burdens associated with world economic inequities." Shandra et al. (2011a, 2011b, and 2011c) also use the world polity perspective to examine debt-for-nature swaps, International Monetary Fund and World Bank Structural Adjustment programs, and World Bank Lending and the impacts on deforestation. They find significant and beneficial effects of connections to the world polity on forest loss. Frank (1999) and Givens (2014) use the world polity perspective to explain environmental treaty ratification and Givens and Jorgenson (2013) find that the world polity structures individual environmental concern. World polity theory posits that environmental culture is diffused globally and consists of civil society organizing and institutional change.

Another mechanism by which a nation-state's position in the international world system is theorized to have an effect on within-country dynamics is via the global organization of production and trade. Global economic integration in general has been theorized to both increase and decrease both environmental and human well-being. Globalization of production is theorized to increase economic growth and technical advancement and efficiency through technological spillover effects, which can improve well-being and reduce environmental harms in less developed nations (Cole 2004; Cole, Elliot, and Strobl 2008; Mol 1997, 2001, 2002; Mol and Buttel 2002; Mol and Spaargaren 2002, 2005, 2007). Export oriented production and finding a country's comparative advantage in the global economy is encouraged from this perspective (Gilpin 2001).

Conversely, the global organization of production is also theorized as a way for nation-states in an advantageous position within the global economic system to maintain their advantage (McMichael 2008). It is also a way for more developed nations to outsource their undesirable industries and environmental harms to less developed nations via a mechanism referred to as environmental load displacement (Hornborg 2009). The concept of the pollution haven posits that instead of technology spillover and the creation of a pollution halo, the global system of trade encourages nation-states in less advantageous positions to pursue a comparative advantage in export oriented production and/or dirtier industries, thus taking a pollution haven approach, leading to more environmental degradation in less developed countries (Leonard 1988).

Specifically, the political economic theory of ecologically unequal exchange draws attention to unequal relationships in the global system that perpetuate dependent relationships, both in terms of environmental and human well-being outcomes. This perspective builds upon Emmanuel's (1972) concept of unequal exchange by adding an ecological component. Unequal ecological exchange theory portrays a global economy characterized by an unequal flow of value to higher income nations and the externalization of environmental degradation to lower income nations, which in turn results in underconsumption in the less developed nations (Bunker 1984, 1985; Bunker and Ciccantell 2005; Hornborg 1998, 2001, 2006, 2007, 2009; Hornborg et al. 2007; Rice 2007; Stretesky and Lynch 2009; Andersson and Lindroth 2001; Jorgenson, Austin, and Dick 2009; Jorgenson and Clark 2011; Jorgenson 2012; Givens and Jorgenson 2014).

Research on the CIWB and on how nations' CIWB changes through time currently emphasizes the role of economic growth. Theories from comparative global or international perspectives draw attention to looking at how factors of global integration shape the CIWB of nations. Thus, in this dissertation I engage these two theoretical perspectives to advance understanding on the sustainably of nation states through time.

In Chapter 2 I examine integration into the world society, captured by the presence of international nongovernmental organizations (INGOs) and specifically INGOs focused on the environment, EINGOs, and integration into the world polity, measured by the presence of international governmental organizations (IGOs). The world culture espouses ideals of improving environmental and human well-being. Thus, if this type of global integration is having an impact in line with the espoused goals, it should reduce the CIWB of nations. If it does not, world society / polity theory would explain this as a decoupling between goals and outcomes. I find only partial evidence that this type of global integration is effective at reducing the CIWB of countries over time. I find evidence that it reduces the CIWB only in higher income countries, and only when I am analyzing measures of the CIWB created with production measures for CO2 emissions, rather than consumption measures. Overall, I find that world society / polity integration actually increases nations' CIWBs over time.

In Chapter 3 I examine global economic integration and find that global integration reduces the CIWB of more developed nations, and this relationship has been stable over time. While economic integration also has had a negative effect on the CIWB for less developed nations, this relationship is becoming less negative with time, meaning it is becoming increasingly unsustainable. If this trend continues it does not bode well for global sustainability. In terms of the direct assessment of ecologically unequal relationships, I find support for this theory for part of the time period studied among nonhigh income countries, as the theory would suggest.

With this project I address key sociological issues of inequality, human well-being, and development; I explore areas of inquiry in environmental sociology related to sustainability and the production of CO2 emissions that lead to global environmental change; and I test theoretically derived hypotheses from macrocomparative sociological perspectives. I aim to contribute to greater understanding of the CIWB of nations and to contribute to work within the two theoretical areas I engage to develop both theoretical perspectives via continued testing and application of the theories to new areas of research. Overall, the conclusions from this research are that it matters where a nation stands in the global system. Macrocomparative international perspectives from sociology have drawn attention to this dynamic for a long time. This illustrates the need to continue to approach research on issues of global sustainability with sociological insights.

High Life Expectancy Low CO2 Emissions Goldemberg Corner 16 Countries with the lowest CIWB	High Life Expectancy High CO2 Emissions High Income Countries Many OECD countries
Low Life Expectancy Low CO2 Emissions Low Income Countries Underdeveloped Countries	Low Life Expectancy High CO2 Emissions

Figure 1 The Carbon Intensity of Well-Being: Life Expectancy and CO2 Emissions

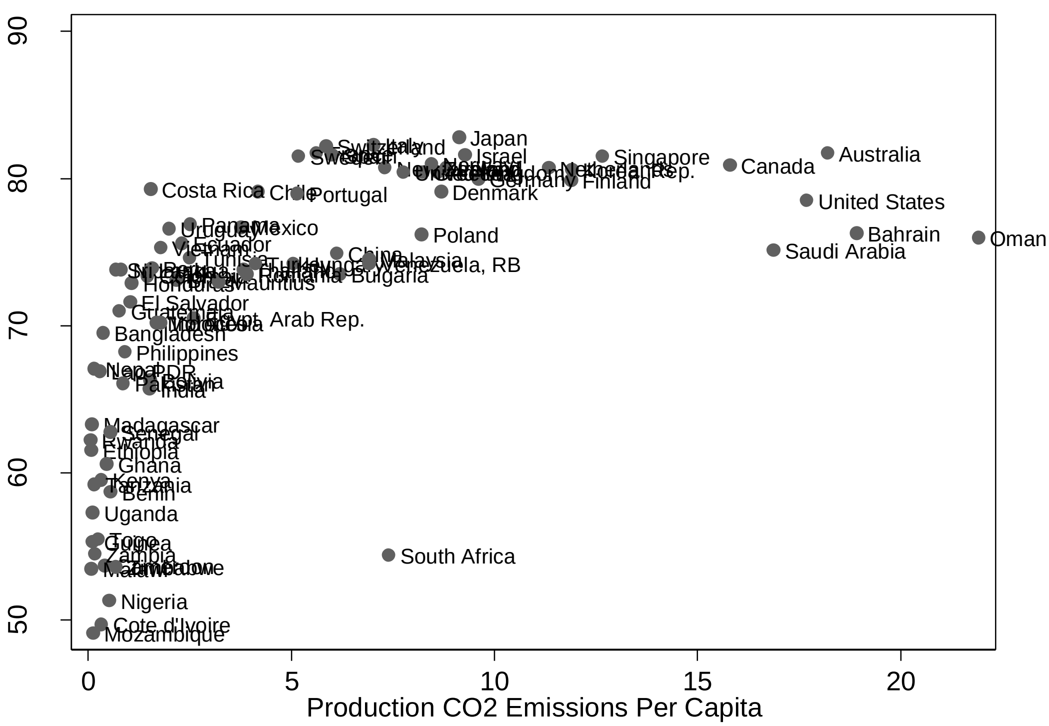

Figure 2 Scatter Plot of Life Expectancy and CO2 Per Capita for 2010

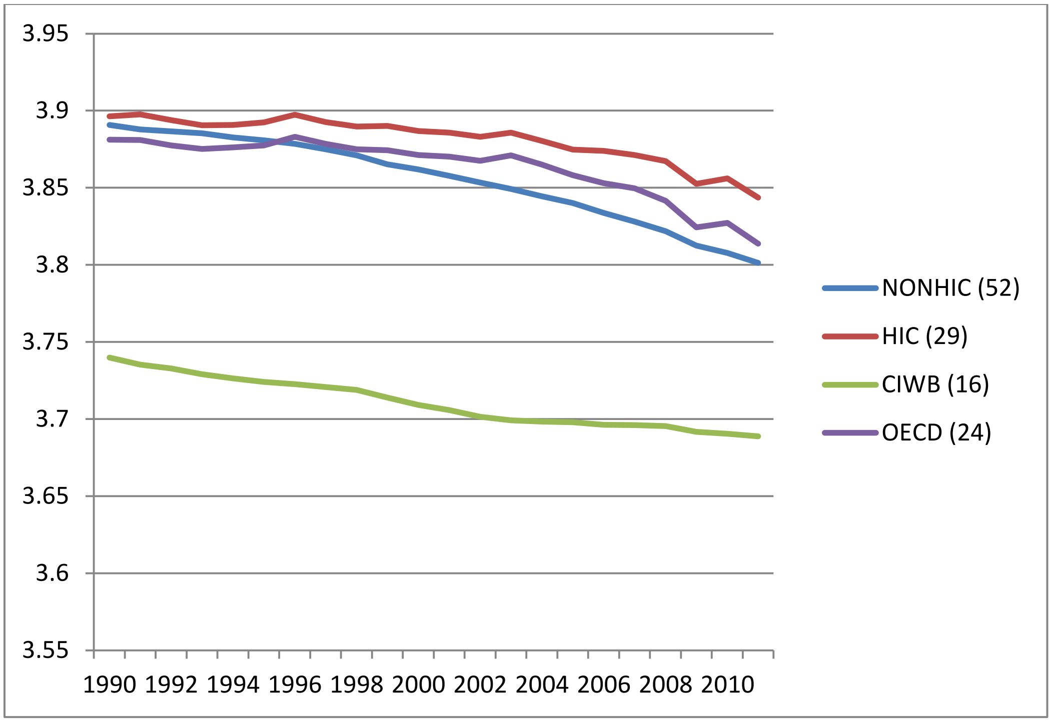

Figure 3 The CIWB for Four Groupings of Countries, 1990-2011

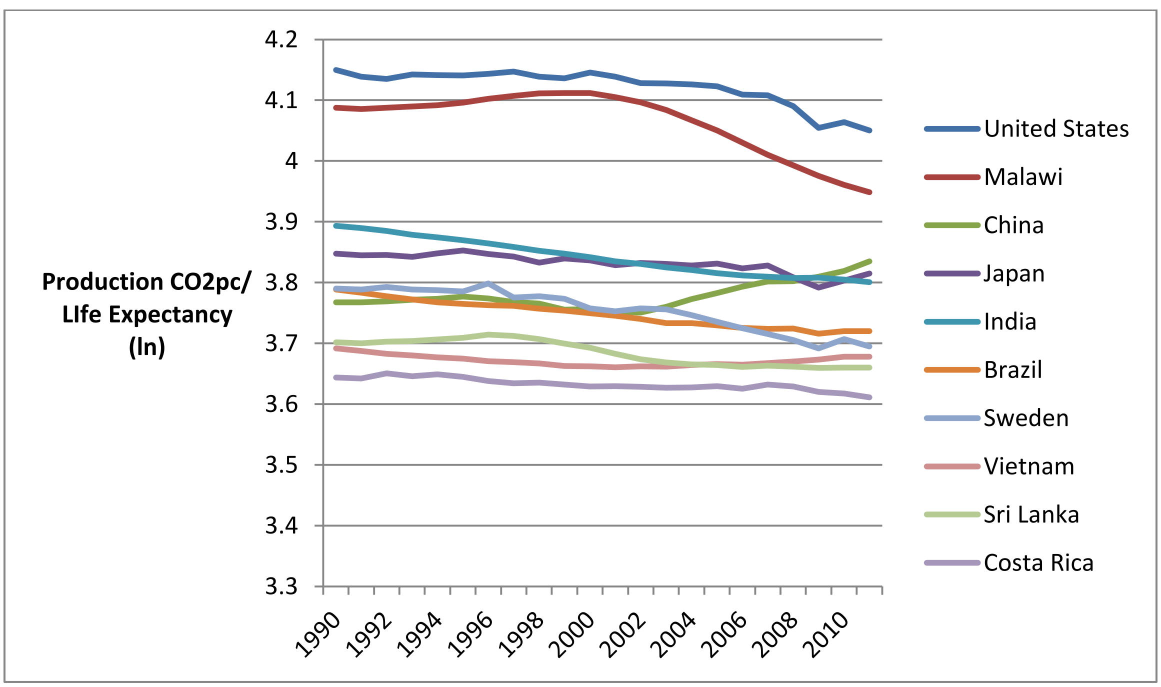

Figure 4 CIWB 1, 10 countries, 1990-2011

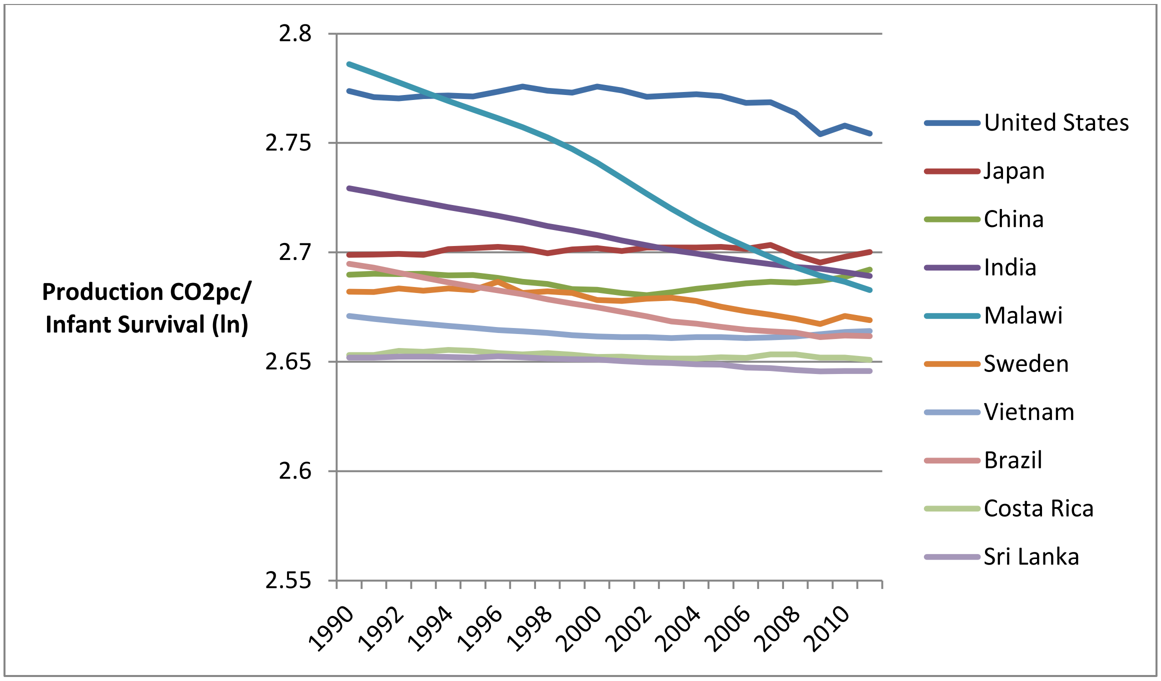

Figure 5 CIWB 2, 10 Countries, 1990-2011

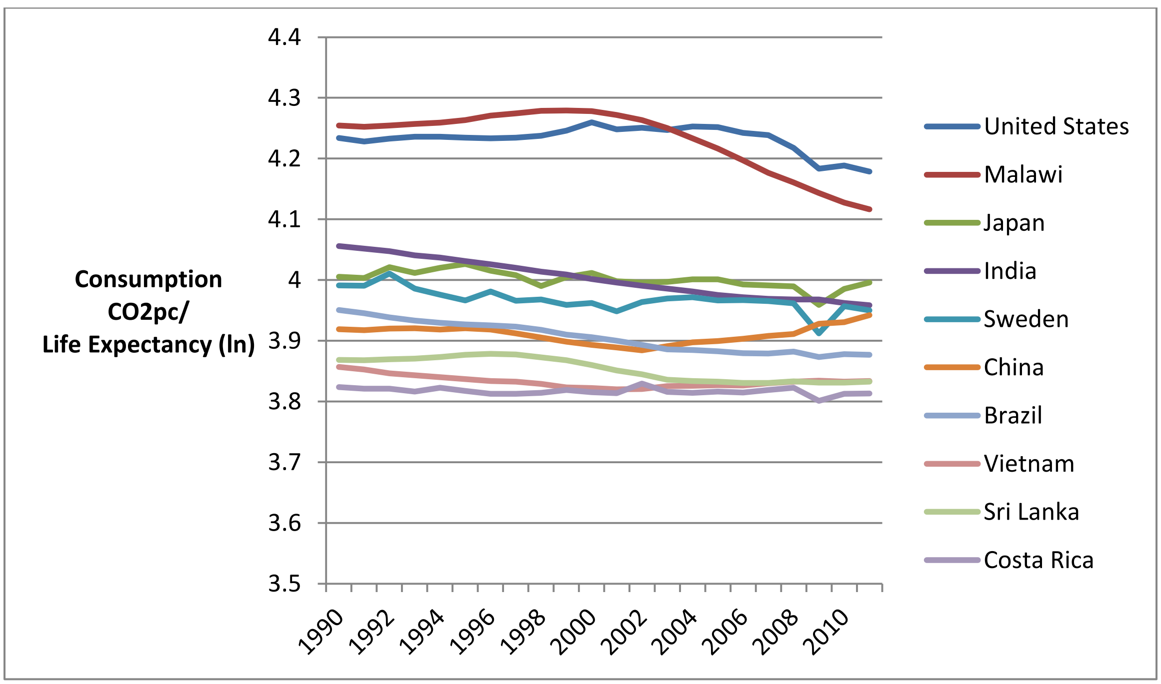

Figure 6 CIWB 3, 10 Countries, 1990-2011

CHAPTER 2

WORLD SOCIETY AND WORLD POLITY INTEGRATION AND THE CIWB

Why is there yet to be an adequate response to global environmental challenges? In part it is because addressing environmental problems is complicated by global inequalities. We know that environmental problems such as climate change and biodiversity loss threaten planetary life support systems and potentially life on the planet as it currently exists (Rockstrom et al. 2009a, 2009b). We also know that lives are already being lost or diminished because of environmental problems such as disasters and pollution (Auyero and Swistun 2009; Freudenberg and Gramlin 2012). However, awareness and knowledge about such circumstances does not mean we have implemented or even agreed upon unified or effective systems at a large enough scale to adequately address environmental challenges. Research on global climate negotiations (Roberts and Parks 2007a) has demonstrated that global inequalities hinder agreement; while some groups of people have contributed to and continue to contribute disproportionately to climate change, others not only disproportionately bear the burdens, but still do not have their basic needs met, even though we live in a world of “unprecedented opulence” (Sen 1999: xi). Amartya Sen (1999: xi) writes that overcoming problems of “deprivation, destitution, and oppression” is a central concern of development. Environmental challenges, however, add a layer of complexity to issues of development, because there is a link between using resources from the natural environment and human material well-being. Likewise, development needs and inequalities add a layer of complexity to dealing with environmental problems. These connections complicate implementation of strategies that require sacrifices on the part of some to either give up or forgo using resources from the environment that are assumed to be linked to human well-being.

How can we increase human well-being without increasing, and while actually reducing, environmental problems? A recently growing body of literature on the carbon intensity of well-being (CIWB) provides a useful way to conceptualize and understand this dilemma and to begin to analyze potential ways forward that may be more sustainable. Macrocomparative sociological research analyzes both the anthropogenic drivers of environmental degradation, including CO2 emissions which contribute to climate change (Jorgenson 2012; Jorgenson and Clark 2012, 2011; Rosa and Dietz 2012), and determinants of human development, health, and well-being (Brady et al. 2007; Clark 2011; Firebaugh and Beck 1994). While overconsumption is often seen as an environmental problem, under-consumption is a related human well-being problem (Jorgenson, Rice, and Clark 2010). Literature on the CIWB combines these two concerns and two bodies of research to analyze development that maximizes well-being while minimizing environmental impact. The CIWB is thus a measure that captures both environmental and social sustainability.

Cross-national research on the CIWB and related measures often analyzes the relationship between economic growth or level of development and how environmentally intensely nations produce well-being for citizens (e.g., Dietz, Rosa, and York 2012; Jorgenson 2014; Steinberger et al. 2012). This is logical because economic growth is often seen as contributing to both human well-being but also to environmental harms such as CO_2 emissions. One finding is that some countries are able to have relatively high life expectancy while not contributing as much CO_2 into the atmosphere as other countries with similar average life expectancies; such countries are said to fall into the Goldemberg Corner, where basic human needs can be met at a minimum energy level (Goldemberg et al. 1985; Lamb et al. 2014; Steinberger and Roberts 2010; Steinberger et al. 2012;). Beyond this threshold, well-being may not be significantly advanced despite higher energy use / CO_2 emissions. Such countries may serve as models of development for less developed countries that want to improve human well-being but not by following the same environmentally destructive path of some of the more developed nations. Similarly, these countries may serve as a model of development for countries with higher rates of CO_2 emissions if a contraction and convergence path toward sustainability is pursued, as is recommended by the Global Commons Institute (A. Meyer 2000).

Research into the CIWB of nations is a developing area of inquiry that raises several interesting questions that this project aims to address. As stated above, much of the current research focuses on the relationship between countries' economic growth and their CIWB. Economic growth is often thought to increase both CO_2 emissions and well-being, and globally both CO_2 emissions and life expectancy follow an upward trend, while globally the CIWB overall is falling. Global economic integration, or the level of development of a country, is one factor that has been established to have an effect on a nation's CIWB. What else can help explain the CIWB of nations? Scholars in this area note that the countries in the Goldemberg corner do not represent a clear pattern or model of development, instead, nations with a relatively high average life expectancy but relatively low per capita CO2 emissions are quite diverse (Lamb et al. 2014). Therefore, this project sheds light on other potential determinants of the CIWB of nations in a longitudinal analysis, specifically by drawing upon macrolevel sociological theory for insights regarding how nation-states and national economies are integrated into the global system.

Neoinstitutional theory, also referred to as world society or world polity theory is one such macrocomparative sociological approach that is often employed to explain global diffusion of institutions, including the global environmental regime (Frank 1997; Frank, Hironaka, and Schofer 2000a, 2000b; Meyer 2010; Meyer et al. 1997b;). Additionally, scholars examine if such diffusion affects real environmental outcomes (Hironaka 2014; Jorgenson Dick and Shandra 2011; Schofer and Hironaka 2005; Shandra et al. 2004, 2009). Thus, this paper draws upon and tests competing hypotheses drawn from this theoretical perspective to shed light on variations in the CIWB of nations. If integration into the world polity or society helps explain the CIWBs of nations, it could be one way to address global environmental inequalities and global environmental change and to counter global forces that lead to environmental and human harms.

The lack of adequate response to agreed-upon environmental issues demonstrates the complexity—that environmental problems are also societal problems—within a system characterized by inequality, from the global to local scale. Nation-states are integrated into this global system in unequal ways and they also have unequal CIWBs. The CIWB represents a conceptualization of sustainability at the nation-state level and global scale that takes into account both human and environmental sustainability. Currently this research is mainly conducted at the global scale, although such an approach could be scaled down if data were available. Recognizing coupled human and natural systems (Liu 2007a, 2000b) and inequalities within these systems is vital to gain a better understanding of the interrelated nature of these problems and potential ways to address them.

Research on the Carbon Intensity of Well-Being

Research on the CIWB is part of a larger body of literature that looks at the connections between economic growth, the use of environmental resources, or environmental through-put, and human well-being (Daly 2005; Dietz and Jorgenson 2014; Dietz, Rosa, and York 2012; Easterlin 1974; Jackson 2009a, 2009b; Prescott-Allen 2001). While it is assumed that humans use the environment to contribute to their material well-being, the exact nature of this environment/society relationship is still an open question; obtaining a better understanding of what nations and citizens gain from environmental exploitation and what the nature of the tradeoffs are could lead to better understandings of sustainability moving forward (Dietz, Rosa, and York 2012).

Within the sociological literature, specifically on the relationship between ecological or carbon intensity and well-being, environmental impact is often measured as ecological footprints (Dietz, Rosa, and York 2012; Knight 2014; Knight and Rosa 2011; Jorgenson and Dietz 2014; see also Dietz, Rosa, York 2009), energy use (Jorgenson, Alekseyko, Giedraitis 2014; Mazur 2011; Mazur and Rosa 1974;), or CO2 emissions (Jorgenson 2014; Lamb et al. 2014; Steinberger and Roberts 2010; Steinberger et al. 2012). Well-being is usually measured as life expectancy, or occasionally as subjective well-being (Knight and Rosa 2011). While some of the literature is referred to using the term environmental efficiency of well-being (EWEB) (Dietz Rosa York 2009; Knight and Rosa 2011), the literature increasingly looks at the environmental intensity of well-being (EIWB) (Dietz, Rosa, York 2012), or the carbon intensity of well-being (CIWB) (Jorgenson 2014).

Dietz, Rosa, and York (2012: 26) are the first to create and use the measure, used here, of how intensely a nation is producing well-being for its citizens. They call it a "foray into this reformulation of development" and state that one of their main efforts with the article is to open a new realm for theoretical and analytic inquiry. Conceptualizing the sustainability of a nation-state is difficult. Countries with the lowest CO2 emissions may appear to be environmentally sustainable on this measure alone, but clearly they are socially unsustainable because many citizens in these countries struggle to meet basic needs. Thus, such a country is not truly sustainable and thus cannot serve as a model to be emulated. The CIWB approach offers a valuable way to link two components of development and sustainability: "balancing human well-being with impacts on the biophysical environment" (Dietz, Rosa, York 2009:114). Some limitations to this measure are that it is human focused, rather than taking into account the intrinsic value of other species, and that even nations that are very efficient at generating well-being could still be ecologically unsustainable. Strengths of the approach are that it captures human and environmental dimensions of sustainability, it is comparable across time, and it is flexible to different indicators of environmental and human well-being (Dietz, Rosa, and York 2009).

Earlier works contributed to this approach. In an article that is seen as foundational, Mazur and Rosa (1974) ask if massive energy consumption is necessary to maintain current living standards in the U.S., since other countries use less energy but maintain comparable living standards. While they find a high correlation between energy consumption and lifestyle when examining a global sample of countries, when they limit the sample to developed countries many of the correlations are no longer significant. Much research notes the correlation between energy consumption and indicators of well-being; however, whether the relationship is causal bears testing and Mazur (2011) finds a lack of association between energy consumption and improvements in quality of life over the past thirty years in developed nations. In an article on drivers of the ecological footprint, Dietz, Rosa and York (2007) find, in line with other research from the human ecology perspective (Rosa and Dietz 2012; Rosa, York, and Dietz 2004; York, Rosa, and Dietz 2003), that population and affluence are key drivers of environmental consumption. However, they also find that increased life expectancy and education do not have a significant effect on increasing environmental stressors, indicating that well-being in these areas can be improved without incurring high environmental costs. This article gives us a picture of an alternative form of development that is not necessarily focused on economic growth or increased affluence, which are often found to be associated with larger environmental impacts (Jorgenson and Clark 2011, 2013; York, Rosa, Dietz 2003).

Much current work in the environmental or carbon intensity of well-being literature focuses on the effect of economic growth. Dietz, Rosa, and York (2012) directly question a reliance on economic growth to achieve environmentally efficient well-being. They empirically test ecological modernization theory by looking for evidence of a Kuznets curve patterned relationship (Mol 2001). Kuznets (1995) argued that as countries follow a trajectory of development income inequality at first increases and then after a turning point declines. Scholars have frequently applied this concept to the relationship between economic growth and environmental impacts, looking for evidence of an ecological Kuznets curve (EKC). Dietz et al. (2012) test for an EKC where the relationship between economic growth and the environmental intensity of well-being is an inverted U—as economies grow they first create well-being very intensely but after passing a turning point they are able to create well-being less intensely—leading to a decoupling of growth and the CIWB. In fact, the authors find some opposing evidence that at high levels of economic development well-being is being created very environmentally intensely, although the authors do find some evidence of varying country trajectories. Jorgenson and Dietz (2014) examine the ecological intensity of well-being in developed and less developed countries over time. They find that in less developed countries economic growth has had little impact on the ecological intensity of well-being while it has somewhat increased intensity in developed countries. These findings indicate a focus on economic growth could be a less effective strategy for improving well-being and could negatively impact sustainability. Jorgenson (2014) looks at the relationship between economic growth and the carbon intensity of well-being in multiple countries and regional samples from 1970 to 2009. Jorgenson finds that while economic growth will likely improve well-being, overall results in this regional analysis suggest that it will be at the cost of an increasing CIWB. In a related work, Jorgenson, Alekseyko, and Giedraitis (2014) analyze the energy intensity of well-being (EIWB) in Central and Eastern Europe from 1992 to 2010. This region is necessarily neglected in Jorgenson (2014) due to a lack of data for Central and Eastern European countries before 1992, but the analysis for this region of countries transitioning from command to market demand economies yields some evidence of encouraging results regarding the effect of economic growth on sustainability. In a related analysis Knight (2014) analyzes change over time in the relationship between demands countries place on the environment using the ecological footprint and human well-being. Knight finds in developed countries the relationship has weakened while he finds somewhat differing results in less-developed countries.

While not explicitly framed as the ecological or energy efficiency or intensity of well-being, three articles represent the work of another group of scholars studying the relationship between human needs and environmental impacts: Steinberger and Roberts (2010), Steinberger et al. (2012), and Lamb et al. (2014). Steinberger and Roberts (2010) look at the decoupling of energy and carbon from human needs by using indicators of well-being such as the Human Development Index (HDI) and life expectancy. They find that past a certain point of development increasing carbon does not have major advantages in terms of progress on well-being. The authors frame this as a decoupling between carbon and human needs and state that if resources were equally distributed current energy levels are sufficient to satisfy global human needs, even at high levels. Citing Goldemberg et al. (1985), they discuss the concept of a minimum threshold of energy consumption or emissions production that would meet all human needs globally and would prevent global carbon dioxide (CO2) concentrations from rising above 450 ppm; but they also note the need to consider change, and to explore how these relationships might change over time. They do this using a unique method in which energy and carbon are used to predict human development indicators in a linear regression, and then a subsequent series of linear regressions are performed on the fit parameters of the original regressions to explore the relationship between carbon and human development over time. This analysis yields a series of thresholds for given human development levels and represents “a global quantification of the concept of environmentally efficient well-being” (Steinberger and Roberts 2010:429). Steinberger and Roberts (2010) find HDI is increasing with time and is attainable at lower and lower levels of energy consumption. Steinberger et al. (2012) go on to address one element of these global relations concerns by looking at global trade and exploring how the relationship between development and emissions changes when emissions are adjusted for trade. They use new consumption based measures of CO2 emissions, which I also employ in my analysis here, from Peters et al. (2011). One of their especially interesting findings is that high life expectancies can be found in countries with low carbon emissions, but high incomes are associated with high carbon emissions. This finding links back to earlier findings (Mazur and Rosa 1974: Dietz, Rosa, and York 2009) that while environmental exploitation does not have significant effects on well-being, affluence affects both environmental degradation and well-being. Thus, these connections must continue to be explored. The article also notes that there is great variation in the trajectories that countries follow which cannot be explained by country history alone, thus also suggesting the value of exploring what insights theories of global integration and global relations can shed on global patterns of carbon intensity and well-being. Lamb et al. (2014: 7) also examine this new measure of consumption based CO2 emissions and the impacts of nation-state level drivers in a cross sectional analysis and find potential patterns of a new class of “sustainability states.”

Neoinstitutional Theories of Global Integration

Much of the current research on the CIWB analyzes the role of economic integration or economic change over time on the CIWB of nations; however, neoinstiutional approaches such as world society or world polity theory shed light on the social construction of global cultural norms that influence social reality and are not reducible to economic or political forces alone (Boli and Thomas 1997; Frank 1997; Meyer et al. 1997a). Although it is not from the world society perspective, see also Freudenberg, Frickel, and Gramling (1995) on the social construction of a mountain for another view on social construction. The world society / polity approach is macrocomparative and offers a theoretical explanation of global diffusion of institutions, including the global environmental regime (Frank et al. 2000a; Meyer et al. 1997b). Also, theoretically derived hypotheses can be empirically tested to see if such diffusion affects real environmental and human well-being outcomes (Hironaka 2014; Jorgenson Dick and Shandra 2011; Schofer and Hironaka 2005; Shandra et al. 2004, 2009). Integration into the world polity or world society, especially as related to the environment, may be a type of global integration that can counter global forces that lead to environmental and human harms. Thus, propositions regarding variation in nation-states' CIWB can be derived from this theoretical approach.

This theoretical perspective sees nation-states as socially-constructed and embedded in a transnational system of social norms that influence outcomes in ways that are not necessarily functional based on local demands, but are instead more a product of the top down diffusion of these global cultural norms (Meyer et al. 1997a). This world polity or society emphasizes the importance of science and rational progress and principles of universalism, world citizenship, individualism and individual agency (Boli and Thomas 1997; Meyer 2007). International nongovernmental organizations (INGOs) are a key element of world society and are simultaneously both the product of global norms in the absence of a global state and the carriers of these norms (Boli and Thomas 1997, 1999). Thus, much research in this area looks at a country's level of INGO presence, as an indicator of connection to the world society. Some research differentiates world society research, with an emphasis on civil society, and world polity research, which focuses on political institutions such as international governmental organizations (IGOs) or state treaty ratifications, although other times the terminology is used interchangeably (see Beckfield 2003). Research has looked at the global diffusion process in varying contexts such as education (Boli et al. 1985; Frank and Meyer 2007), science (Schofer 2003), women's suffrage (Ramirez, Soysal and Shanahan1997), female genital cutting (Boyle 2002), individual environmental concern (Givens and Jorgenson 2013), and ratification of human rights and environmental treaties (Hafner-Burton and Tsutsui 2005; W. Cole 2005, 2012a, 2012b; Frank 1999; Roberts 2004; Givens 2014).

The environment is a key area of interest in world society and world polity research. Some research looks at the origins and diffusion of the regime, from INGO association, to treaties and intergovernmental organization such as environmental commissions within the UN (Meyer et al. 1997b). Frank et al. (2000a) discuss the importance of top down diffusion of the idea that protection of the environment is a government responsibility and examine various nation-state activities aiming to protect the environment. Buttel's (2000) critique raised the question of whether world society or world polity integration actually makes a difference in environmental outcomes, sparking a clarifying response from Frank et al. (2000b) and leading to a stream of research that tests world society impacts on environmental outcomes, often assessed by looking at connections to the world society as indicated by INGO or EINGO (environmental international nongovernmental organization) presence.

World society theory is increasingly applied to both environmental and health and well-being topics. Research finds evidence of the impact of civil society organizations and emphasizes the global cultural diffusion that drives such organizing and policy change (Frank, Longhofer, and Schofer 2007; Longhofer and Schofer 2010; Schofer and Hironaka 2005; Schofer and Longhofer 2011; Smith and Wiest 2005). Many studies find a beneficial impact of connections to the world society on outcomes such as CO2 emissions, organic water pollution, deforestation and industrial organic water pollution and human health (Jorgenson 2008, 2009a; Shandra et al. 2004, 2009, 2011a). Jorgenson et al. (2011: 81) find that while global economic integration contributes to environmental harms, world society integration has a mitigating impact on deforestation associated with foreign investment, indicating that "civil society groups and their collective actions at the transnational and global levels are able to mollify—at least to some extent—the environmental burdens associated with world economic inequities" (see also Jorgenson 2009a, 2009b). Shandra et al. (2011a, 2011b, and 2011c) also use the world society perspective to examine debt-for-nature swaps, International Monetary Fund and World Bank Structural Adjustment programs, and World Bank Lending and the impacts on deforestation. They find significant and beneficial effects of connection to the world society on forest loss.

A key idea within world society and world polity research is the potential for decoupling of goals from realities, or policies from outcomes, and this highlights the need to identify circumstances that make this decoupling less likely (Schofer and Hironaka 2005). Decoupling is not only a key idea within the theoretical perspective, but also one that has much empirical support; the concept of decoupling gets at the gap between norms or ideals and actual behaviors (Meyer 2009). Meyer (2009: 51,59), explaining decoupling, writes that global models often "reflect ideas beyond what is practicable" in wealthy countries, not to mention in less-developed countries. He goes on to explain actors, including both individuals and associations, are socially constructed in world society as having levels of agency that "vastly transcends the realistic capabilities of the participating actors" (see also Meyer 2007). Although world society / polity theory can be seen as aligned with some of the ideas of ecological modernization theory, (Mol 1997, 2001), in that both emphasize global diffusion and adoption of environmental norms, world society / polity theory identifies this diffusion as resulting from top down global diffusion of norms as opposed to a reaction to environmental needs (Frank, Hironaka, and Schofer 2000; J. Meyer 2000). It is unique in its acknowledgement of and attention to the notion of decoupling between cultural / institutional structures and practices (Meyer et al. 1997a). Also, unlike ecological modernization, world society / polity theory does not assume environmental protections will follow development but, to the contrary, expects they will be globally diffused regardless. However, Guillen (2001), citing Meyer and Hannan (1979), emphasizes that the theory describes a world society characterized by convergence of form but not necessarily of outcomes. In an underappreciated but related finding, Beckfield (2003:418) questions the concept of convergence and points out that like the world economy, the world society and the world polity are also highly unequal and dominated by rich Western countries, and thus these countries are able to exert disproportionate influence on global cultural norms. His findings also indicate IGO linkages have become less unequal over time, while INGO linkages have become more unequal; a finding he explains by suggesting that perhaps "while state structures converged over this period, societies did not." In a later network analysis of IGOs Beckfield (2010) finds the world polity has become more uneven and he finds growing evidence of regionalization. Likewise, in a network analysis of INGOs Hughes et al. (2009) find evidence of inequality between the West and the rest of the world and highlight the importance of regional differences.

A final important point in terms of decoupling is that according to this theoretical perspective, global models are also elaborated to "solve global problems of legitimation, not only to be useful in practice" (Meyer 2009: 51; J. Meyer 2000). Along these lines, in an analysis of Montreal Protocol ongoing implementation Gareau (2013) finds that there are two types of INGOs, those that legitimate the process of global environmental negotiations without having much impact although they are allowed to have some voice in the process, and those that are critical but are totally excluded from the process. Neither path currently leads to such organizations and carriers of world society cultural norms having much pro-environmental impact on the ongoing process to limit use of materials that harm the ozone layer, despite their presence representing world society's concern for the environment.

In addition to these complexities of decoupling, a final key element of the theory is the concept of differentiating between direct and diffuse effects. This is the idea that regardless of the presence of EINGOs or INGOS within specific countries, or regardless of whether certain environmental treaties or policies are adopted, this global diffusion can still have an effect on environmental and human well-being outcomes. Variously referred to as a diffuse effects (Cole 2012a), the "bee swarm model" (Hironaka 2014: 7), or "a cascade of reinforcing dynamics" (Schofer and Hironaka 2005:40), this concept suggests that even if direct effects are not detected, the world society can still be having an impact on real outcomes. This concept can make world society scholars reluctant to specify direct mechanisms by which the world society impacts environmental outcomes, unlike ecological modernization scholars who see the environmental state as key to environmental reform (Mol and Spaargaren 2002, 2005, 2007) and unlike scholars of environmental governance from other disciplines who focus on mechanisms via which institutions influence environmental outcomes (e.g., Young 2002). World society and world polity scholars are cautious about overtly specifying mechanisms because while one mechanism in one instance may appear to be failing to have an effect, this could lead one to miss a larger overall impact (Schofer and Hironaka 2005).

Despite this complexity with direct versus diffuse effects, in this paper I mainly test the direct effects of connection to the world society and the world polity on the CIWB of nations; however, this leads me to draw two competing hypotheses from this theoretical perspective. First, I hypothesize that more world society and world polity integration, indicated by INGO, EINGO, and IGO presence, will have a negative, i.e., desirable in that it is more sustainable, effect on the CIWB, since such organizations are carriers of a world society / polity that purports to value human and environmental well-being. Conversely, I hypothesize that I may not see a direct effect of organizational presence in terms of diminishing the CIWB, even as the world society / polity is able to decrease the global CIWB via indirect measures. A final proposition could be that world society / polity connection will be associated with an increase in the CIWB, as organizations chase growing problems without attaining solutions and/or as those organizations are simply performing a legitimating function (J. Meyer 2000, 2009), legitimating inequalities produced by unequal economic and power structures in the global system, (Beckfield 2003; Gareau 2013). Thus, there is absolute decoupling from goals and effects.

Research Design

The data used in these analyses are for a sample of 81 countries with yearly data from 1990 to 2011. I estimate models for the entire sample of 81 countries, and also for a split sample of 52 nonhigh income countries and 29 high income countries. As a sensitivity analysis I also estimate models for a sample of 25 OECD countries, a sample of 16 countries with the lowest carbon-intensity of well-being, in other words those countries that are said to fall into the Goldemberg corner of relatively high life expectancy with relatively lower emissions, in addition to multiple other sensitivity analyses that involve various other groupings of countries and exclusion of outliers.
In terms of global coverage, these 81 nations represent 85% of the world's population based on population data from 2011 (World Bank World Development Indicators. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). According to the World Bank's country and lending groups classification, in my sample I have 39% of countries classified as high income, and regionally in terms of "developing" countries the data contain 43% of Sub-Saharan African nations, 50% of nations in Latin

America and the Caribbean, 19% of nations in Europe and Central Asia, 38% of nations in Asia, and 23% of nations in the Middle East (World Bank. http://data.worldbank.org/about/country-and-lending-groups. Accessed September 4, 2014). The 81 countries represent countries for which I was able to obtain a perfectly balanced data set, i.e., no missing data, with minimal imputation. I did impute Lao PDR EINGO for 2011, and Germany INGO and IGO for 1990, in addition to cleaning a few obvious typos in the data on INGOs and IGOs for one year each for the following countries: Germany, Greece, Ireland, Italy, Netherlands, Poland, and Portugal. Table 1 lists the countries included in the analyses.

The three dependent variables are all variations on a measure of the carbon intensity of well-being (CIWB), a ratio between a measure of carbon emissions and a well-being measure. The first dependent variable is *production*-based carbon emissions per capita divided by *life expectancy*, the same ratio used by Jorgenson (2014). The second dependent variable is *production-based* carbon emission per capita divided by *infant survival*, and the third dependent variable is *consumption-based* carbon emissions divided by *life expectancy*. Scholars have noted the potential to explore other measures of well-being and to compare production versus consumption based measures within the CIWB literature (Dietz and Jorgenson 2014).

The data for the production-based carbon dioxide emissions (CO2) come from the World Resources Institute's CAIT 2.0 climate data explorer (Available at www.cait2.wri.org. Accessed August 2, 2014). The CAIT CO2 emissions data includes CO2 emissions from energy and cement manufacture but excludes emissions from land use change and forestry. The creators of the CAIT aim to produce a comprehensive data set that is comparable over time. To create the most accurate, complete, and comparable data the CAIT uses data from multiple sources including the Carbon Dioxide Information Analysis Center (CDIAC), the International Energy Agency (IEA), the UNFCCC from official country submissions, and the U.S. Energy Information Administration (EIA). These CO2 emissions measures are used in cross national comparative research (Jorgenson and Clark 2012, 2010; Jorgenson, Clark, and Kentor 2010) and are highly correlated with other commonly used sources for CO2 emissions data such as those from the World Bank. For the 81 countries included in my analyses the two measures are correlated at .99, however, I chose to use the WRI's CAIT data because it was updated through 2011.

The data for the consumption-based CO2 emissions come from the Global Carbon Atlas (Available at www.globalcarbonatlas.org. Accessed August 2, 2014). These data are updated from Peters et al. (2011). (Available at http://www.pnas.org/content/108/21/8903.full and http://www.pnas.org/content/suppl/2011/04/20/1006388108.DCSupplemental. Accessed July 13, 2013) and Peters is one of the contributors to the Global Carbon Atlas project. These data are carbon (CO2) emissions from production data adjusted for trade to create CO2 emissions from consumption data, in other words, carbon footprint data. These data are also referred to as emissions embodied in trade in that they account for the emissions generated in the processes of production, which are then attributed to the country of consumption rather than production, using a method known as input-output analysis (IOA). The consumption data are created using two methods, emissions embodied in bilateral trade (EEBT) and multiregion input-output (MRIO). The EEBT attributes emissions to the country where the goods are consumed, regardless of whether or not it is final consumption or intermediate consumption in the process of production for consumption elsewhere, while the MRIO attributes the emissions to the country in which the final consumption occurs; one method is not better than the other, they just differently attribute emissions to countries in the global supply chain production process. Both methods are used to construct detailed estimates for the years 1997, 2001, and 2004. The detailed EEBT estimates for 1997, 2001, and 2004 are then used as proxies to represent 1990-1998, 1999-2002, and 2003-2008, respectively, to create annual estimates for the years 1990-2008, referred to as time series with trade (TSTRD). Use of the EEBT method means that the estimates of consumption emissions are more conservative than if the MRIO were used to create the annual estimates because with the EEBT emissions are not only attributed to final consumption. The EEBT method also uses the technology of the producing country to estimate the emissions embodied in the production. The annual estimates are created based on national emissions estimates using data from the Carbon Dioxide Information Analysis Center (CDIAC), expenditure components of GDP from the United Nations Statistics Division (UNSD) modified to match the results from a one-sector input-output analysis (IOA), and bilateral trade data from the Global Trade Analysis Project (GTAP). The CO2 emissions are from fossil fuel combustion, cement production, and gas flaring, but omit land use change, transport data, and other greenhouse gas emissions. The authors note that their results across the different methods are consistent with other studies using IOA and that such comparisons suggest their country level emissions results are robust. The information described here along with additional detail is provided in the Appendix to Peters et al. (2011).

The CO_2 emissions data from both sources are provided in millions of metric tons; therefore, I use population data from the World Bank (World Bank World Development Indicators. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014), and convert total emissions data into per capita measures in metric tons so that both parts of the CIWB ratio are composed of averages: average CO_2 emissions per person and average life expectancy per person.

Analyses with both the production measures and the consumption measures are useful to examine and compare in order to get at different aspects of the carbon intensity of well-being. Production measures relate to economic development and global integration strategies of nation states. Consumption, on the other hand, may be more closely linked to well-being (Knight and Rosa 2011). Although they are correlated at .93 in my data, the production and consumption measures have changed differently over time for countries at different levels of development. Peters et al. (2011), the creators of the consumption data, find that emissions in more developed / higher income / Annex B countries have stabilized but emissions in less developed / lower income / nonAnnex B countries have doubled. Thus, what appears to be emissions reductions in more developed countries can be partially attributed to relationships of international trade: developed countries import more goods from less developed countries, leading to emissions transfers via international trade. During the period of the study emissions from the production of exports grew faster than global population, overall CO_2 emissions, or global GDP, making emissions from trade relatively equivalent to emissions from land use change (Peters et al. 2011). The authors also find that overall emissions from traded goods and services and net emissions transfers have both increased, and trade between less developed countries has grown more rapidly than trade from less to more developed countries. Still, more developed countries tend to be net importers of carbon emissions, so their consumption based emissions are higher than production based emissions, while the reverse is true for less developed countries.

The data for the well-being measures come from the World Bank World Development Indicators (Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). Life expectancy is total life expectancy at birth, or the total number of years an infant would be expected to live if patterns of mortality at the time of its birth remained the same throughout its life. I create infant survival by taking infant mortality rate, which is the number of infants dying before reaching their first birthday per 1,000 live births, and subtracting this value from 1,000 to create the infant survival rate. While the two measures of well-being are correlated at .93, these two measures have been found to have divergent trajectories as related to development (Brady, Kaya, and Beckfield 2007; Clark 2011); perhaps because infant and child mortality are more affected by levels of poverty and inequality than is overall life expectancy (Dietz, Rosa, York 2009). Tables 2 and 3 provide descriptive statistics and variable correlations. I also looked at under 5 survival, life expectancy for males and females, and male and female survival to 65, but results were substantively the same.

The dependent variable, the carbon intensity of well-being (CIWB) is a ratio dependent variable. In order not to have either the numerator or the denominator have a disproportionate influence on the ratio, I take the same approach as others analyzing the CIWB (Dietz et al. 2012; Jorgenson 2014; Jorgenson and Dietz 2014) and constrain the coefficients of variation, the standard deviation over the mean, to be equal by adding a constant to the CO2 measure. This shifts the mean without changing the variance. The coefficient of variation for my four components of my dependent variable are as follows: production based CO2 1.1119, consumption based C02 1.1159, life expectancy 0.1544, and infant survival .035. Thus, I add the constants 28, 139, and 33, respectively, to the values of CO2 emissions for the three variations on the dependent variable, production-based carbon emissions per capita divided by life expectancy, production-based carbon emission per capita divided by infant survival, and consumption-based carbon emissions divided by life expectancy. I then multiply by 100 to scale the ratio. Thus, using the first dependent variable as an example, the CIWB measure is:

$$CIWB = [(CO2pc + 28) / LE] * 100$$

In all of the models I control for level of economic development as GDP per capita, in constant 2005 U.S. dollars (World Bank. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). This is an important control for a country's integration into the global economy and level of development and is the factor that most research in this area has examined. It is also important to control for economic integration when assessing the effects of world society or world polity integration.

Key variables of interest include indicators of connection to the world society, to the world polity, and to the global environmental regime specifically. To operationalize the concepts, I use data on International Nongovernmental Organizations (INGOs), International Governmental Organizations (IGOs), and Environmental International Nongovernmental Organizations (EINGOs). Using organization connection as a proxy for connection to the world society / polity is well established in the literature (Boli and Thomas 1999; Frank, Longhofer and Schofer 2007; Hafner-Burton and Tsutsui 2005; Smith and Wiest 2005).

Data for INGOs and IGOs come from the Union of International Associations' (UIA) Yearbook of International Organizations and represent counts of INGOs and IGOs. I thank Wade Cole for generously providing these data through 2009. I coded these data using the same methodology for 2010 and 2011. Data for INGOs and IGOs are for types A, B, C, and D in the Yearbook. Data for the EINGOs also come from the (UIA) Yearbook of International Organizations and represent EINGO presence within a nation-state as a nation's number of ties to or chapters of such organizations based on a sample of between 40 and 50 EINGOs. INGOs are treated as environmental based on having environment in the subject index for the organization and being focused mainly on environmental protection. This newly updated measure is closer to a random sample than multiple previous constructions of this variable employed in previous research (Givens and Jorgenson 2013; Frank et al. 2011; and making use of an even earlier version: Frank et al. 2000a; Schofer and Hironaka 2005). I thank Evan Schofer for generously sharing these updated EINGO data.

As is pointed out by Beckfield (2003:418), there is inequality in the global system of organizations; he asserts that, "wealth, the world system, and civilization structure the world polity." In my data GDP per capita and the three world society / polity variables are correlated from .59 for EINGOs and IGOS, to .78 for INGOS, in line with findings that development matters. I do not include results for per capita measures of organizational presence but instead include the logged variable in line with Schofer

(2003; see also Schofer and Meyer 2005) and the understanding that organizational counts are based on presence in a country regardless of the size of citizen membership and also because in this project I am interested in country level outcomes (Schofer. October 25, 2013. Available at http://worldpolity.wordpress.com/page/2/. Accessed October 2, 2014). However, sensitivity analysis using logged per capita measures for each of the three world society / polity variables indicate the results are substantively similar.

To analyze the effects over time of theoretically derived independent variables on countries' carbon intensity of well-being I estimate Prais-Winsten models with panel-corrected standard errors (PCSE). This is an appropriate method for dealing with comparative international time series cross sectional data where data often have the structure of 10 to 100 units observed over 20 to 50 years and where errors may be serially (i.e., temporally) correlated, spatially (i.e., contemporaneously) correlated, and characterized by heteroscedasticity (all the error processes may not have the same variance) (Beck and Katz 1995). Beck and Katz (1995) advocate for this method as more appropriate than other methods such as the feasible generalized least-squares estimator (FGLS), which can underestimate variation in the data and thus understate standard errors of the estimated coefficients. This can lead to over-confidence and increases the chances of making type 1 errors. While OLS estimates of model parameters often perform well and yield coefficients that are consistent across methods, their estimates of standard errors are often inaccurate (Beck and Katz 1995; Wooldridge 2007 p427, 431). Thus, the method suggested by Beck and Katz (1995) and employed here retains OLS parameter estimates but uses panel corrected standard errors, which deal with spatial correlation and heteroscedasticity while the Prais-Winston transformation corrects for AR1 / serial correlation. I include country-specific and year-specific intercepts, making the model equivalent to a two-way fixed effects model. These intercepts allow me to control for and examine country-specific and year-specific effects. As with a fixed effects model, this technique estimates effects within countries over time rather than between countries and controls for variation between countries. This model construction is especially well-suited to hypothesis testing as it controls out all period-specific and country-specific variation. For this reason models are parsimonious and only control for level of development, the key world society or world polity independent variable of interest, and this key variable interacted with time, to analyze the impact of the variable on the CIWB and change in the effect of the independent variable on the CIWB over time. All variables in the model are logged, thus estimated coefficients are elasticity coefficients where a 1 percent change in the independent variable leads to an estimated percent change in the dependent variable equal to the coefficient for that independent variable. An example of an estimated model is as follows:

$$CIWB_{it} = B_1 GDP\ per\ capita_{it} + B_2 INGO_{it} + B_3 year1991_t + \ldots + B_{23} year2011 + B_{24} INGO_{it} * year1991_t + \ldots + B_{44} INGO_{it} * year2011_t + u_i + e_{it}$$

The dependent variable, $CIWB_{it}$, is one of three variations on a calculation of the carbon intensity of well-being, measured as a ratio of: production-based carbon emissions per capita to life expectancy, production-based carbon emissions per capita to infant survival rate, or consumption-based carbon emissions per capita to life expectancy. Every model includes GDP per capita, $B_1 GDP\ per\ capita_{it}$, as a control variable, the year specific intercepts, $B_3 year1991_t + \ldots + B_{23} year2011$, the country specific intercepts, u_i, and the error term for each country for each time point, e_{it}. Successive models then control for one of the key independent variables of interest, such as INGO presence as indicated in the model above, $B_2 INGO_{it}$, and the interactions between this variable of interest and the dummy variables for each year, $B_{24} INGO_{it} * year1991_t + \ldots + B_{44} INGO_{it} * year2011_t$. The coefficient for INGO presence indicates that a 1 percent change in INGO presence leads to a percent change in the carbon intensity of well-being equal to the coefficient for INGO presence in the reference year, in this case 1990. For the other time points, the effect, if significant, is the sum of the coefficient for GDP per capita and the coefficient for the interaction term; if the interaction term is not significant the coefficient is the same as the reference year. In the case of a nonsignificant effect for the reference year, but a later significant interaction with time, the reference year is interpreted as being not significantly different than zero.

Results and Discussion

Tables 4-8 report the findings for the estimated models for the *production* based carbon intensity of well-being, using *life expectancy* as the indicator of well-being, for each of the five samples of nations. Tables 9, 10, and 11 report the findings for the estimated models for the *production* based carbon intensity of well-being, using *infant survival* as the indicator of well-being, for each of the three samples of nations. Tables 12, 13, and 14 report the findings for the estimated models for the *consumption* based carbon intensity of well-being, using *life expectancy* as the indicator of well-being, for each of the three samples of nations. Each of these tables reports the elasticity coefficients for the estimated effect for the key variable under consideration for each year, INGOs, EINGOs, or IGOs, respectively; each of these tables also includes the coefficient for the control variable GDP per capita. Each table also reports the number of countries and number of observations included in each group, although the number of observations simply equal the number of countries included multiplied by 22 since I have perfectly balanced panel data sets and 22 time points. Although I do not report r-square statistics, the r-square statistic never falls below .9961 in any of the estimated models; such high r-square statistics are due to unreported country specific and year specific intercepts, (equivalent to two-way fixed effects) and are consistent with other research employing similar methods (Jorgenson and Clark 2013).

Figures 7 through 18 graphically depict the elasticity coefficients for each of the three CIWB variables for each of the three independent variables. In other words, the graphs more clearly depict the information contained in the tables. The graphs of the elasticity coefficients indicates how the effect of the independent variable on the CIWB has changed over time, for each of the three groups of countries, and the height of the bar indicates the magnitude of the effect. To arrive at the elasticity coefficients I first determine if the baseline year is statistically significant. If it is, the coefficient for each year is the sum of the baseline year coefficient and the coefficient for the year's interaction effect if the interaction effect is significant; if the interaction effect is not significant, the coefficient for that year is the same as the coefficient for the baseline year. If the main effect is not significant, I assume this means the effect does not differ significantly from zero. Thus, if the interaction effect of the variable with the year is significant, the elasticity coefficient is simply equal to the coefficient for the interaction effect. If the interaction effect is also not significant, in other words neither the main effect nor the interaction effect is significant, the elasticity coefficient is equal to zero.

First I will discuss the findings for the estimated models for the *production* based carbon intensity of well-being, using *life expectancy* as the indicator of well-being, for each of the six samples of nations. Controlling for GDP per capita as an indicator of position in the global economy is an important control when making comparisons to world society / polity integration and is also in line with previous research on the CIWB (Beckfield 2003; Jorgenson, Dick, and Shandra 2011; Jorgenson 2014; Lamb et al. 2014). Except for the model with all 81 countries and the model for the nonhigh-income countries, the effect of the control variable, GDP per capita, is positive and statistically significant, consistent with previous research (Jorgenson 2014; Lamb et al. 2014). For the first independent variable of interest, INGO presence, the elasticity coefficient for 1990 for all 81 countries is nonsignificant and is thus 0; however, in 1991 the interaction with time is significant and thus the elasticity coefficient is negative .003, indicating that a 1percent increase in INGO presence led to a .003 percent decrease in the CIWB. However, we can see in Table 4 and in Figure 7 that the effect of a one percent increase in INGO presence leads to a positive effect in 1994 for all 81 countries, in 1995 for the nonhigh income countries, and in 1993 for the high income countries. For example, in 1996 a 1percent increase in INGO presence leads to a .013 percent increase in the CIWB for the sample of all countries, a .017 percent increase in the CIWB for the sample of nonhigh income countries, and a .011 percent increase in the sample for high income countries. After these years the effect remained positive and increasing in the samples of all countries and the nonhigh income countries, but for the high income countries it began decreasing in 1997 and became negative in 2000 and continued decreasing. These results indicate that while world society may intend to target environmental and human well-being problems and generally have goals in line with reducing the CIWB of nation-states, it appears this goal is only being achieved in the group of countries that fall into the high income category. In the sensitivity analysis that looks at the grouping of the 16 countries with the lowest CIWBs compared to the group of OECD countries, the results are consistent with these findings. One thing to note is that although INGO integration has a less pronounced effect on the variation over time within the sample of 16 low CIWB countries, it has a more pronounced effect on the variation over time within the sample of OECD countries, and it becomes increasingly negative. In other words, if we compare the elasticity coefficients for INGOs for the year 2000 in Table 5 and Table 7, a 1 percent increase in INGO presence is associated with a .034 percent increase in nonhigh income countries and a .008 increase in the 16 countries with the lowest CIWB. This indicates the magnitude of the effect of INGOs is larger in the nonhigh income countries compared to the 16 countries with low CIWBs, where the effect is smaller. This can also be seen by a comparison of the bar sizes in Figure 7. Figure 8 depicts the results for the EINGO presence on the CIWB, which are very similar to the results for the INGO presence. One difference is that in the sensitivity analysis the general trend for the 1990s is that in OECD countries EINGO presence had a positive effect on the CIWB that is not seen in the sample of high income countries. However, after the year 1999 EINGO presence has a negative and increasingly negative effect on the CIWB, in line with the results for the sample of high income countries. Another difference is that rather than being positive as it is for the nonhigh income countries, the effect of EINGO presence in the 16 low CIWB countries is nonsignificant except for three years in which it is negative, 2006, 2009, 2010. In 2010 a 1percent increase in EINGO presence led to a .006 decrease in the CIWB in these 16 countries. This provides slight evidence that in the 16 low CIWB countries EINGOs might be having an effect in line with the stated goals.

For the world polity variable, IGO presence, in Tables 5 and 6 and in Figures 9 and 12, we see a negative but increasing effect of world polity integration for the nonhigh income countries from 1990 to 1996. After this period the effect of IGO presence is positive and increasing, whereas after 1999 in the high income countries IGO presence is associated with a trend of decreasing CIWB. In the sensitivity analysis the results are similar for the OECD countries, but nonsignificant for the 16 low CIWB countries.

Overall these comparisons indicate several things. One is that if the goals of world society and world polity organizations are to improve human well-being and environmental degradation, results are only in line with those goals in the samples of high income and OECD countries, and only beginning in about 2000. The lack of intended effect in nonhigh income countries could be due to world society organizations going to where the problems are, or chasing problems on a global scale, and in the face of increasing environmental and other problems, not having a detectable effect on the CIWB. In terms of IGOs, less-developed nations could be increasingly entering into the world polity, but still facing increasing environmental and human well-being dilemmas. My results could also be explained with Meyer's (2009) point that the world society and polity play a legitimating function, and behaviors or outcomes are not always in line with goals. This decoupling could also be due to lack of capacity, either on the parts of the organizations or within the states themselves. Another interesting finding is that while we see similar results for high income and OECD nations, we see less pronounced or nonsignificant results for the 16 nations with the lowest CIWB compared to other nonhigh income countries. This indicates that international organizations do not have a lot of explanatory power regarding the variation over time in the CIWB in these nations, except in the analysis of EINGOs on the 16 low CIWB countries, where we do see slight evidence of a negative impact of this type of world society integration on the CIWB. The main place where global integration into the world society and world polity does seem to be having the effect of diminishing the CIWB is in the high income or OECD countries, however, one is cautious of placing too much stake on this claim because the most pronounced negative effects coincide with the years of the global economic recession, beginning in 2008. While the period specific fixed effects should account for some of this, if more developed countries were more affected by the global recession, this variation could be excluded by the time effects. However, considering the negative trend began in the early 2000s this does look like a potentially valid finding for the role of world society integration reducing the CIWB of high income nations.

For the estimated models for the *production* based carbon intensity of well-being, using *infant survival* as the indicator of well-being, depicted in Tables 9, 10, and 11 and in Figures 13, 14, and 15, for each of the three samples of nations, the findings are very similar in terms of the overall trends to the models described above. While I had expected to possibly see a different effect here of world society or world polity organization, it also makes sense that the results are similar because these two indicators of well-being are highly correlated at .93 in the data for the sample of 81 countries.

Turning to the findings for the estimated models for the *consumption* based carbon intensity of well-being, using *life expectancy* as the indicator of well-being, for each of the three samples of nations, there are some interesting differences compared to the models for the production based carbon intensity of well-being described above. The main finding is that when we look at the impact of INGO, EINGO, and IGO presence on the CIWB of the high income countries, the countries in which we previously saw world society and world polity organization having the desired effect of diminishing the CIWB using the production based measure of CO2, in Table 12, 13, and 14 and in Figures 16, 17, and 18, we now see such global integration having a negative but much diminished, a nonsignificant, or even positive effect on the CIWB in high income countries. This indicates that while world society and polity integration of high income countries may be having an effect on production decisions within those countries, consumption decisions are not being as clearly impacted. These findings could be a result of society and polity dynamics such as NIMBY (not in my back yard) dynamics at a global scale as environmental organizations pushing for the relocation of polluting facilities or of stricter environmental regulations in more developed nations displacing dirtier production facilities to less developed countries (Gould, Schnaiberg, and Weinberg 1996; Leonard 1988; M. Cole 2004; Pellow 2007). Such dynamics of international economic organization and global production will be explored in more detail in Chapter 3.

Finally, while I find either limited effects of world society or world polity organization in achieving goals of improving well-being and diminishing environmental harms, or I find the exact opposite effect, world society and polity integration increasing the CIWB, these are all analyses of direct effects of this type of global integration using organizational presence as a proxy. This is exactly what the diffuse, cascading, or bee swarm concept of world society / world polity approaches call into question (Cole 2012a; Schofer and Hironaka 2005; Hironaka 2014). Along these lines, although I cannot test for it specifically using these models, the unreported period specific intercepts for time are consistently negative and significant across all of the models. While I cannot be certain that there is a diffuse effect of world society or world polity integration captured in these fixed effects, it could be likely and I cannot rule it out in the current models. In future analyses I plan to further explore empirical tests of this aspect of the theory.

Conclusion

Global sustainability and attaining universal human well-being above a certain basic threshold are elusive goals. In order to analyze the status of nation-states in achieving these goals it is necessary to come up with a way to measure and quantify the sustainability of nation-states, but environmental sustainability without social sustainability is not a useful concept. The carbon intensity of well-being (CIWB) offers a way to simultaneously examine environmental and social sustainability by looking at how carbon intensely nation-states are producing well-being for their citizens. Although even nations with the lowest carbon intensities of well-being, such as Costa Rica, could still be environmentally unsustainable, these low CIWB countries offer a model of a path that other countries, both more and less developed, could pursue toward improved social and environmental sustainability in conjunction.

While much research on the CIWB of nation-states has focused on the impact of economic growth and development on the CIWB, this paper begins with the question of what can counter forces that increase state’s CIWBs and what explains variation over time in the CIWB of nations, especially what explains the low CIWBs of the Goldemberg corner countries. International nongovernmental organizations (INGOs), environmental versions of such organizations (EINGOs), and international governmental organizations (IGOs) often have as their stated aims improving human health and well-being and/or the environment. World society or world polity theory identifies these as goals of the world society / polity and identifies such organizations as both product of and carriers of this global culture. This theoretical perspective can be seen as suggesting that such organizations can have a direct, a diffuse, or a counter-intuitive, due todecoupling, impact on real human and environmental outcomes. The evidence from the analyses presented here show evidence of all three possibilities in different contexts. While the evidence for direct effects is found mainly in more developed countries when looking at CIWBs constructed using production based measures of CO2 emissions, there is a potential that diffuse effects exist more broadly but are captured in the time trends in the data and the overall reduction of the CIWB with time. Finally, the results of world society / polity global integration on the production versus consumption measures of the CIWB caution against overly optimistic assessments of the efficacy of these organizations or of this type of global integration, even in the more developed countries.

While the evidence presented here shows some support for the impact of the world society and polity in varying contexts, the findings could also contribute to the development of a greater understanding of the legitimating function of the world society / polity. While scholars from this intellectual tradition often talk about the legitimation conferred on states as they become part of organizations or treaties, the results from this analysis might be more in line with those who find that the world society / polity legitimates the global inequalities in the system, serving the interests of the West (Beckfield 2003) or giving the illusion of voice in global negotiations (Gareau 2013) while not having strong direct effects on the environmental and human well-being impacts examined here. It may not be so much about powerful nations overtly controlling the world society / polity as Beckfield (2003) suggests, because the complexity of modern organizations makes control by elites difficult (DiMaggio and Powell 1983), but powerful nations still dominate the world society / polity in value-based and cultural ways. Beckfield's (2003; 2010) analyses suggest that the world society / polity is mainly "Western" and my data do reveal a high correlation with world society / polity integration and level of development. The world society / polity espouses ideals such as development, human well-being, human rights, and environmental quality, and yet INGO and IGO efforts in these areas fall short. Yet even their existence legitimates the power structure of the system as organizations embody and perpetuate the script that such organizations are the way to counter the "bads" of the global economic system, despite the fact that at least in these analyses they seem to be rather ineffective. In this perspective the world society / polity "reflects and reproduces preexisting structures of domination" (Beckfield 2010).

On the other hand, it is important not to reify such organizations; they are likely filled with many earnest individuals who, empowered by goals of individualism and agency, feel empowered to act and genuinely wish to counter the negative environmental and human impacts of the global economic system. Furthermore, much research does find the importance of connection to world society, especially in terms of fostering domestic environmental association (Longhofer and Schofer 2010; Schofer and

Longhofer 2011). Further research could further explore different contexts in which world society / polity integration and organization presence has a beneficial negative effect on the CIWB.

Polanyi (2001) wrote that humans and the environment cannot be treated as commodities; they are false commodities, because treating them as commodities will lead to their ultimate destruction. Instead, something has to emerge to protect individuals and the environment from market forces. For Polanyi (2001:136) this was the state, but in regulating the market, the state actually allows the market to continue to exist and in turn the state too grows in a "double movement" that keeps the entire system running and growing. As INGOs take over some roles of the nation-state and call for nation-states to better protect citizens and the environment, they too have potential to counteract forces that harm human and environmental well-being in line with Polanyi's concept of a double movement. Therefore, the weak or lack of support for world society / polity theory in this analysis should continue to be explored moving forward and the CIWB offers an interesting and useful area for testing and extending this theoretical perspective. The differences between the production and consumption CIWBs suggest additional analyses on the role of trade in countries' CIWBs should be conducted, and it is to this that I turn in Chapter 3. Additionally, other determinants of the CIWBs of nations need to be explored, as do alternative measures of well-being, such as subjective measures; these are two projects I will pursue in the immediate future. Other projects have found regional differences in the relationship between growth and the CIWB (Jorgenson 2014) and based on the finding of regional importance by others in regard to world society and polity (Beckfield 2003, 2010) that would be useful to employ when looking at world society / polity, trade, or other variables. Finally, there is potential to explore the CIWB of units at smaller scale than nation-states, dependent upon data availability.

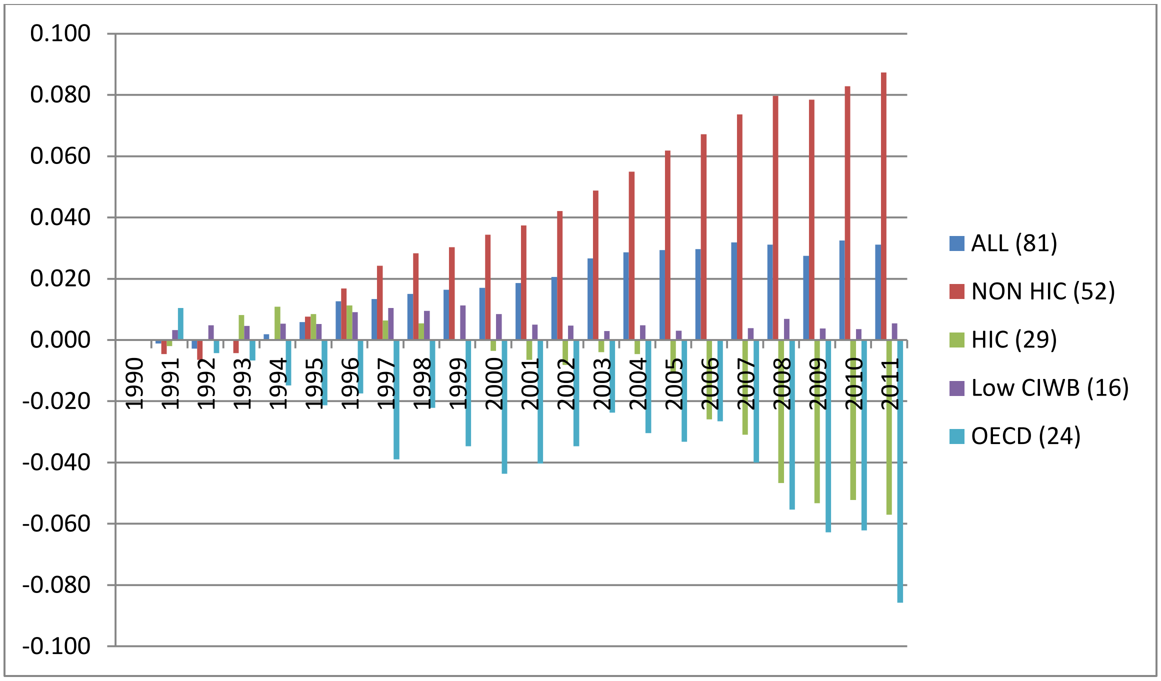

Figure 7 Elasticity Coefficients for the Estimated Effects of INGOs on Production-Based CIWB, 1990-2011

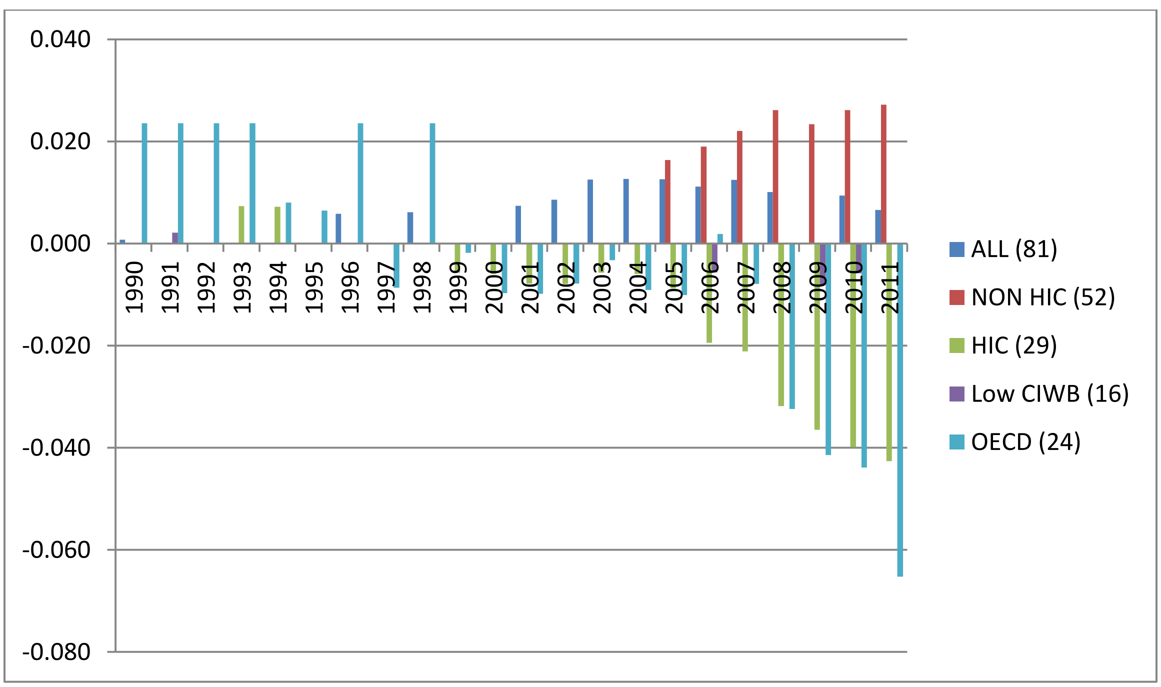

Figure 8 Elasticity Coefficients for the Estimated Effects of EINGOs on Production-Based CIWB, 1990-2011

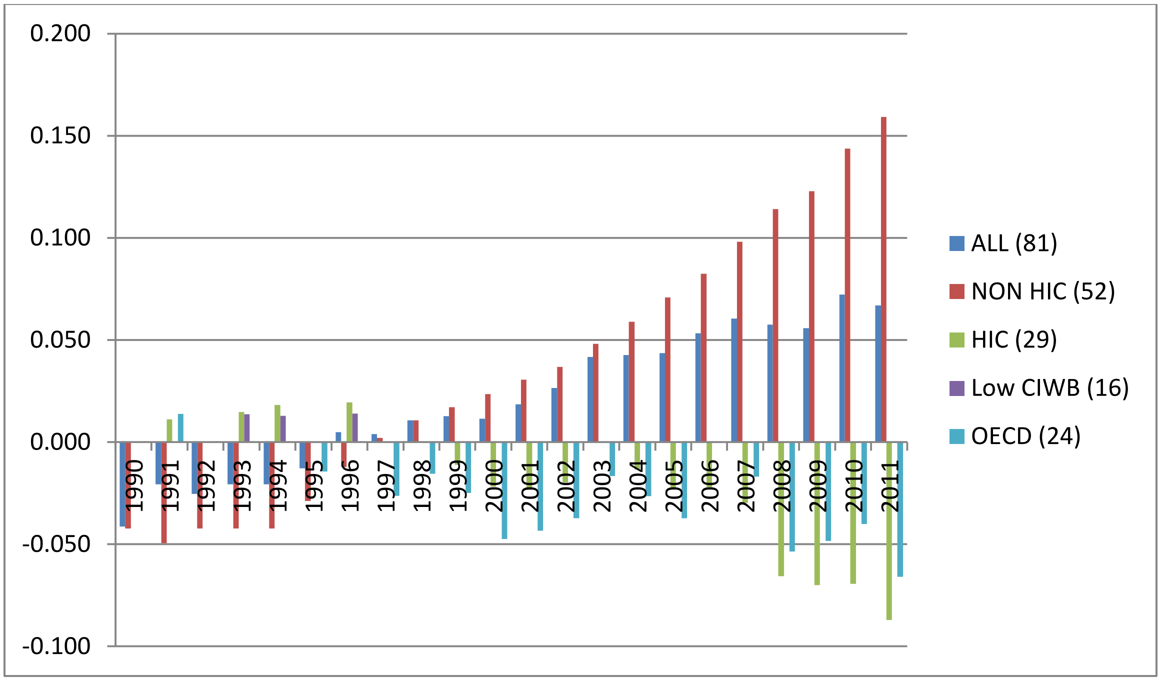

Figure 9 Elasticity Coefficients for the Estimated Effects of IGOs on Production-Based CIWB, 1990-2011

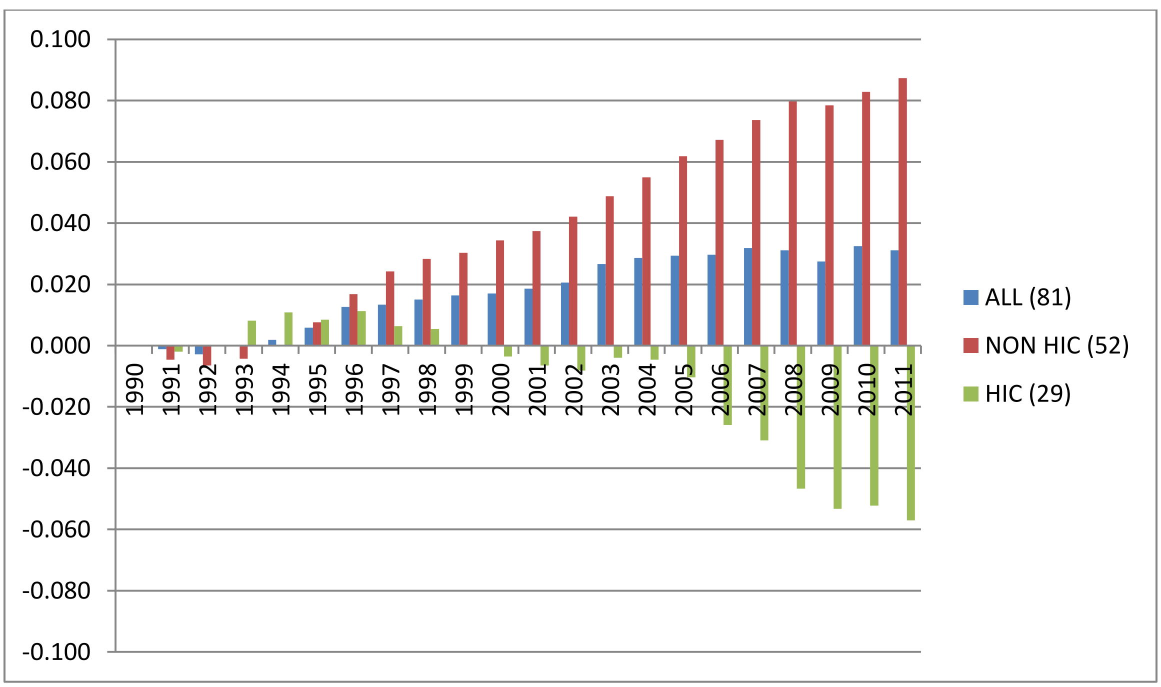

Figure 10 Elasticity Coefficients for the Estimated Effects of INGOs on Production-Based CIWB, 1990-2011

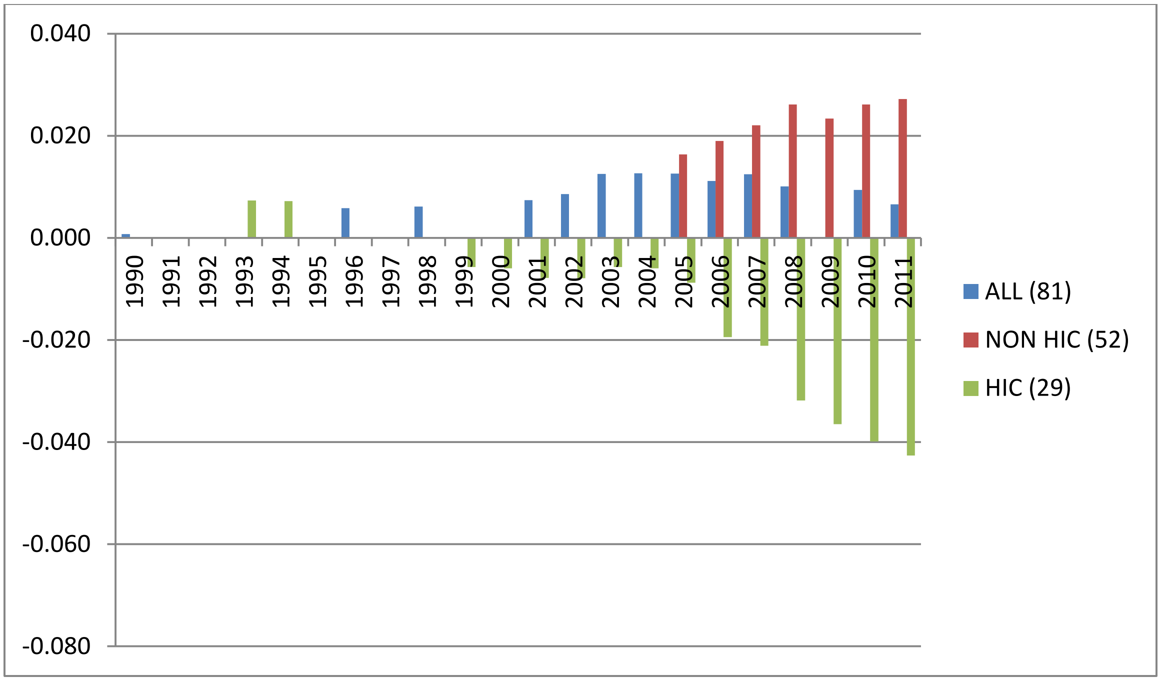

Figure 11 Elasticity Coefficients for the Estimated Effects of EINGOs on Production-Based CIWB, 1990-2011

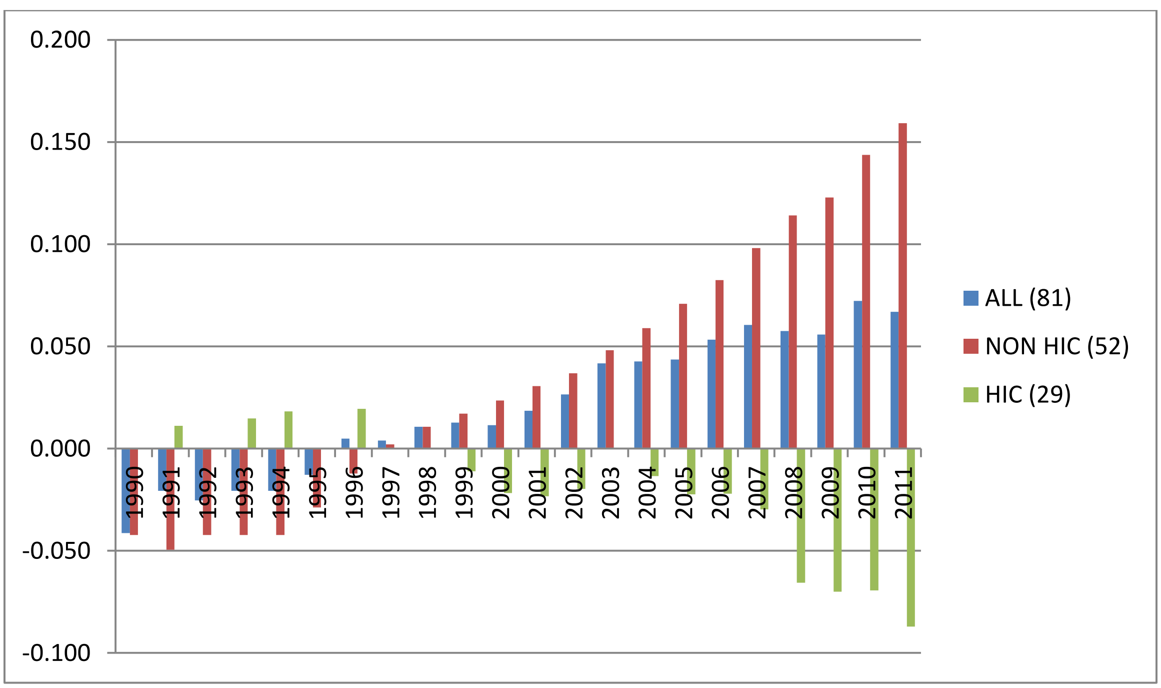

Figure 12 Elasticity Coefficients for the Estimated Effects of IGOs on Production-Based CIWB, 1990-2011

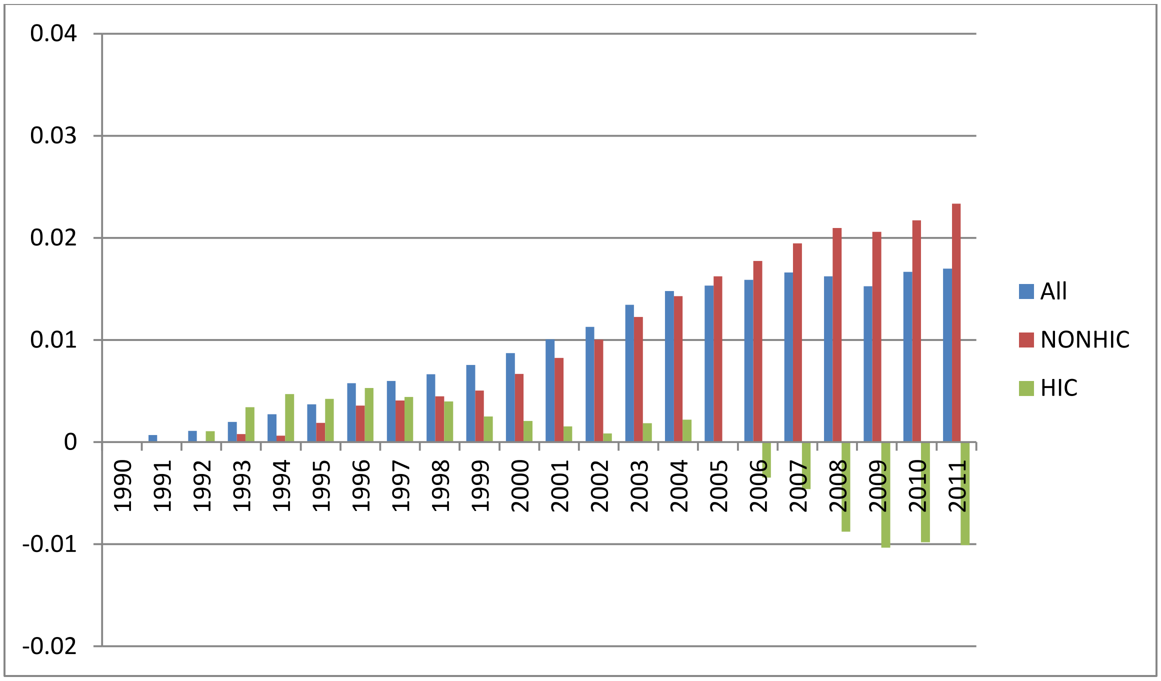

Figure 13 Elasticity Coefficients for the Estimated Effects of INGOs on Production-Based CIWB with Infant Survival, 1990-2011

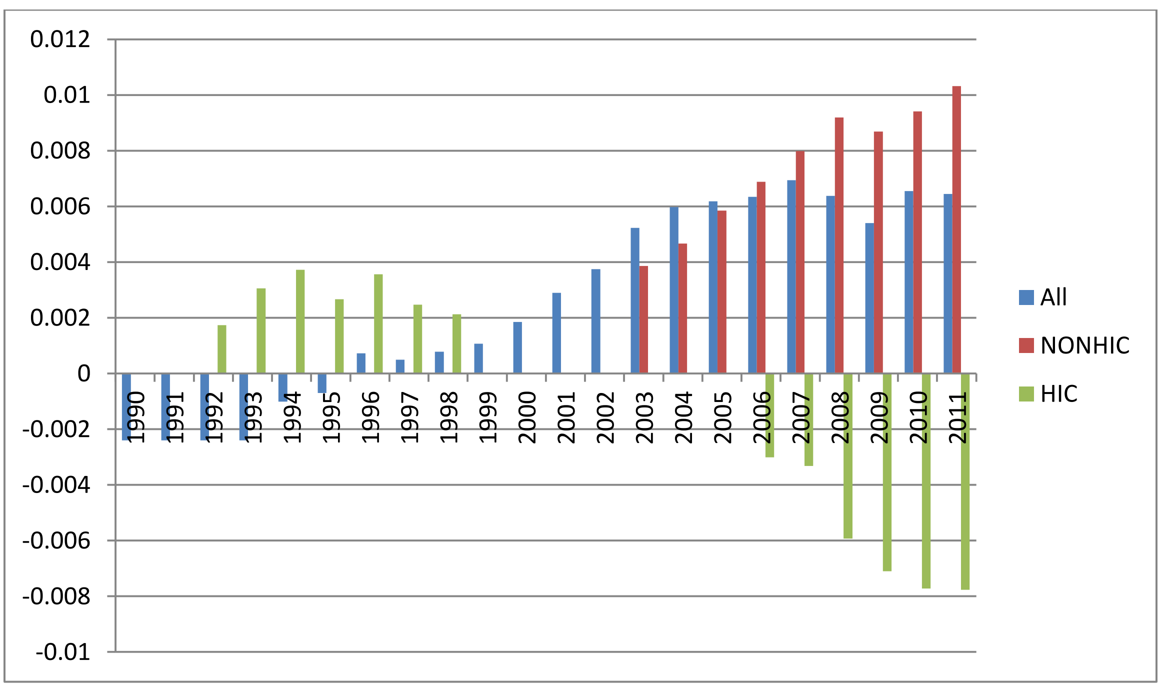

Figure 14 Elasticity Coefficients for the Estimated Effects of EINGOs on Production-Based CIWB with Infant Survival, 1990-2011

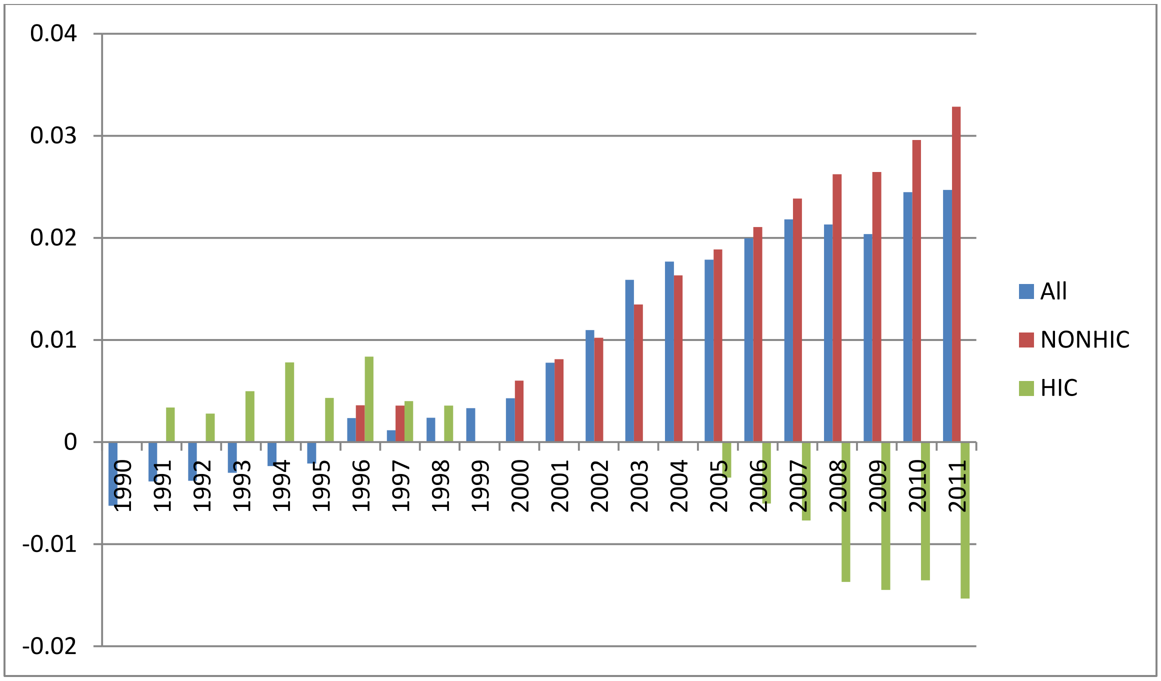

Figure 15 Elasticity Coefficients for the Estimated Effects of IGOs on Production-Based CIWB with Infant Survival, 1990-2011

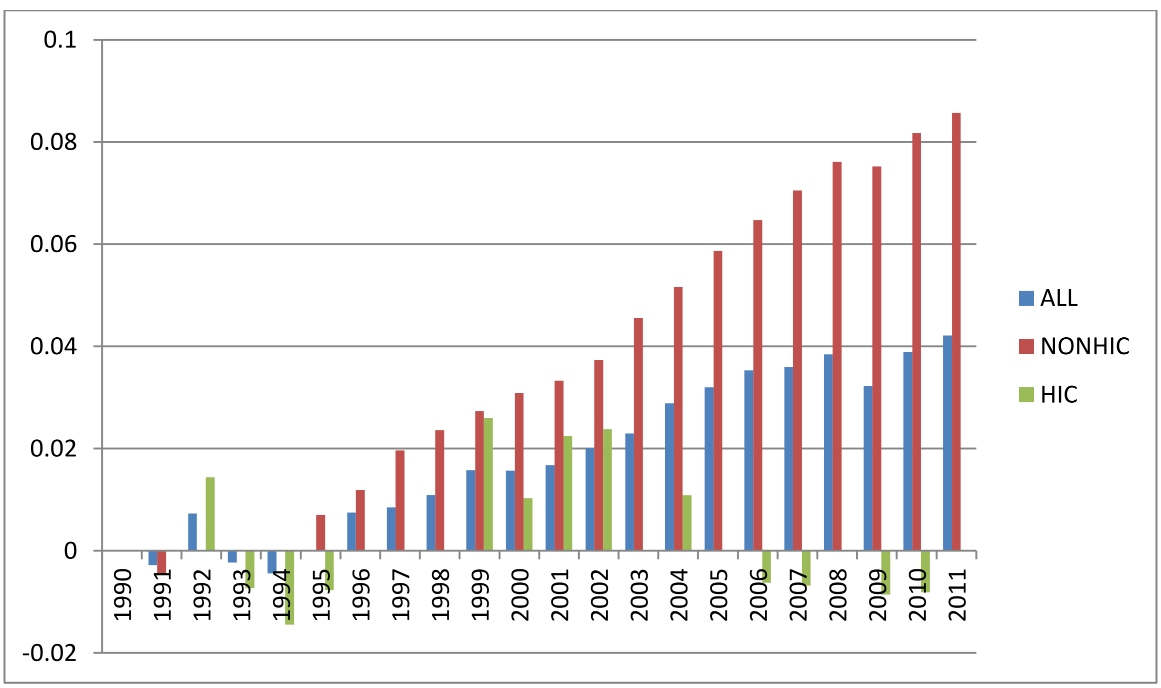

Figure 16 Elasticity Coefficients for the Estimated Effects of INGOs on Consumption-Based CIWB, 1990-2011

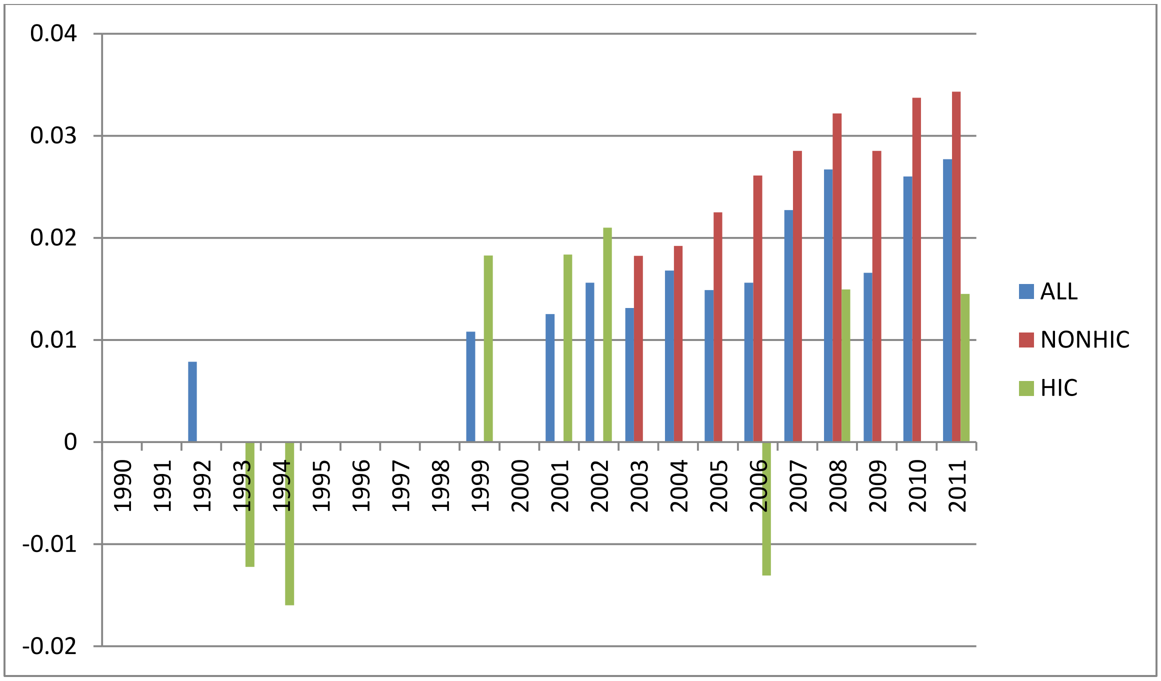

Figure 17 Elasticity Coefficients for the Estimated Effects of EINGOs on Consumption-Based CIWB, 1990-2011

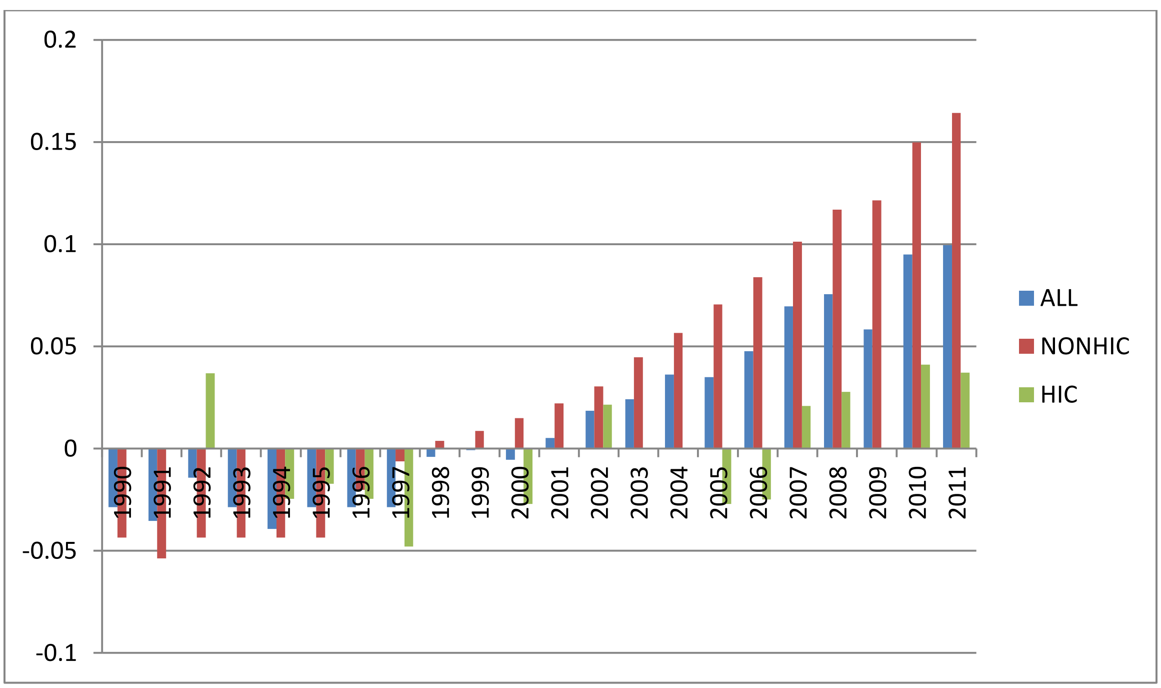

Figure 18 Elasticity Coefficients for the Estimated Effects of IGOs on Consumption-Based CIWB, 1990-2011

Table 1 Countries Included in the Analyses

ALL (81)	NONHIC (52)	HIC (29)	All (79)	CIWB (16)	OECD (24)
Australia		Australia	Australia		Australia
Austria		Austria	Austria		Austria
Bahrain		Bahrain			
Bangladesh	Bangladesh		Bangladesh		
Benin	Benin		Benin		
Bolivia	Bolivia		Bolivia		
Brazil	Brazil		Brazil	Brazil	
Bulgaria	Bulgaria		Bulgaria		
Cameroon	Cameroon		Cameroon		
Canada		Canada	Canada		Canada
Chile		Chile	Chile	Chile	Chile
China	China		China		
Colombia	Colombia		Colombia	Colombia	
Costa Rica	Costa Rica		Costa Rica	Costa Rica	
Cote d'Ivoire	Cote d'Ivoire		Cote d'Ivoire		
Denmark		Denmark	Denmark		Denmark
Ecuador	Ecuador		Ecuador	Ecuador	
Egypt, Arab Rep.	Egypt, Arab Rep.		Egypt, Arab Rep.		
El Salvador	El Salvador		El Salvador	El Salvador	
Ethiopia	Ethiopia		Ethiopia		
Finland		Finland	Finland		Finland
France		France	France		France
Germany		Germany	Germany		Germany
Ghana	Ghana		Ghana		
Greece		Greece	Greece		Greece
Guatemala	Guatemala		Guatemala		
Guinea	Guinea		Guinea		
Honduras	Honduras		Honduras	Honduras	
Hungary	Hungary		Hungary		
India	India		India		
Indonesia	Indonesia		Indonesia		
Ireland		Ireland	Ireland		Ireland
Israel		Israel	Israel		Israel
Italy		Italy	Italy		Italy
Japan		Japan	Japan		Japan
Kenya	Kenya		Kenya		
Korea, Rep.		Korea, Rep.	Korea, Rep.		Korea, Rep.
Lao PDR	Lao PDR		Lao PDR		
Madagascar	Madagascar		Madagascar		
Malawi	Malawi		Malawi		
Malaysia	Malaysia		Malaysia		
Mauritius	Mauritius		Mauritius	Mauritius	
Mexico	Mexico		Mexico	Mexico	
Morocco	Morocco		Morocco		
Mozambique	Mozambique		Mozambique		
Nepal	Nepal		Nepal		

Table 1 Continued

ALL (81)	NONHIC (52)	HIC (29)	All (79)	CIWB (16)	OECD (24)
Netherlands		Netherlands	Netherlands		Netherlands
New Zealand		New Zealand	New Zealand		New Zealand
Nicaragua	Nicaragua		Nicaragua	Nicaragua	
Nigeria	Nigeria		Nigeria		
Norway		Norway	Norway		Norway
Oman		Oman	Oman		
Pakistan	Pakistan		Pakistan		
Panama	Panama		Panama	Panama	
Peru	Peru		Peru	Peru	
Philippines	Philippines		Philippines		
Poland		Poland	Poland		Poland
Portugal		Portugal	Portugal		Portugal
Romania	Romania		Romania		
Rwanda	Rwanda				
Saudi Arabia		Saudi Arabia	Saudi Arabia		
Senegal	Senegal		Senegal		
Singapore		Singapore	Singapore		
South Africa	South Africa		South Africa		
Spain		Spain	Spain		Spain
Sri Lanka	Sri Lanka		Sri Lanka	Sri Lanka	
Sweden		Sweden	Sweden		Sweden
Switzerland		Switzerland	Switzerland		Switzerland
Tanzania	Tanzania		Tanzania		
Thailand	Thailand		Thailand		
Togo	Togo		Togo		
Tunisia	Tunisia		Tunisia	Tunisia	
Turkey	Turkey		Turkey		
Uganda	Uganda		Uganda		
United Kingdom		United Kingdom	United Kingdom		United Kingdom
United States		United States	United States		United States
Uruguay		Uruguay	Uruguay	Uruguay	
Venezuela, RB	Venezuela, RB		Venezuela, RB		
Vietnam	Vietnam		Vietnam	Vietnam	
Zambia	Zambia		Zambia		
Zimbabwe	Zimbabwe		Zimbabwe		

Table 2 Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
1. CIWB 1 Production CO2pc/Life Expectancy	1782	48.184	7.372	36.994	104.872
2. CIWB 2 Production CO2pc/Infant Survival	1782	14.885	0.455	14.092	16.601
3. CIWB 3 Consumption CO2pc/Life Expectancy	1782	56.628	8.460	42.665	123.576
4. GDPpc	1782	11139.420	14712.430	111.800	67804.500
5. EINGOs	1782	10.949	7.892	0.000	39.000
6. INGOs	1782	1318.059	995.880	58.000	4317.000
7. IGOs	1782	53.901	14.371	18.000	96.000
8. Production CO2pc	1782	4.530	5.037	0.031	23.739
9. Consumption CO2pc	1782	5.240	5.847	-0.531	36.815
10. Life Expectancy	1782	68.413	10.564	26.800	85.200
11. Infant Survival	1782	964.746	33.771	844.900	997.800

Table 3 Correlations

	1	2	3	4	5	6	7	8	9	10	11
1. CIWB 1											
2. CIWB 2	0.873										
3. CIWB 3	0.945	0.807									
4. GDPpc	-0.124	-0.062	-0.110								
5. EINGOs	-0.193	-0.228	-0.205	0.593							
6. INGOs	-0.205	-0.197	-0.180	0.780	0.867						
7. IGOs	-0.146	-0.116	-0.160	0.585	0.689	0.766					
8. P CO2pc	0.307	0.404	0.239	0.804	0.376	0.521	0.337				
9. C CO2pc	0.219	0.307	0.279	0.832	0.370	0.562	0.326	0.926			
10. Life Exp.	-0.552	-0.391	-0.553	0.839	0.527	0.669	0.445	0.614	0.637		
11. Inf. Surv.	-0.447	-0.460	-0.453	0.841	0.565	0.683	0.434	0.626	0.640	0.932	
12. Year	-0.158	-0.223	-0.180	0.079	0.380	0.186	0.103	0.041	0.020	0.171	0.226

Table 4 Effect of World Society and Polity Integration on Production-Based CIWB, 81 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.031		0.0196	
INGOs	0.021		0.0169	0.000
INGOs X 1991	-0.001	*	0.0006	-0.001
INGOs X 1992	-0.003	***	0.0008	-0.003
INGOs X 1993	-0.001		0.0009	0.000
INGOs X 1994	0.002	(*)	0.0011	0.002
INGOs X 1995	0.006	***	0.0011	0.006
INGOs X 1996	0.013	***	0.0011	0.013
INGOs X 1997	0.013	***	0.0011	0.013
INGOs X 1998	0.015	***	0.0012	0.015
INGOs X 1999	0.016	***	0.0012	0.016
INGOs X 2000	0.017	***	0.0014	0.017
INGOs X 2001	0.019	***	0.0013	0.019
INGOs X 2002	0.021	***	0.0013	0.021
INGOs X 2003	0.027	***	0.0013	0.027
INGOs X 2004	0.029	***	0.0014	0.029
INGOs X 2005	0.029	***	0.0014	0.029
INGOs X 2006	0.030	***	0.0014	0.030
INGOs X 2007	0.032	***	0.0015	0.032
INGOs X 2008	0.031	***	0.0014	0.031
INGOs X 2009	0.027	***	0.0014	0.027
INGOs X 2010	0.032	***	0.0015	0.032
INGOs X 2011	0.031	***	0.0017	0.031

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.036	(*)	0.0202	
EINGOs	0.001		0.0042	0.001
EINGOs X 1991	0.000		0.0015	0.000
EINGOs X 1992	-0.002		0.0019	0.000
EINGOs X 1993	-0.002		0.0025	0.000
EINGOs X 1994	-0.001		0.0031	0.000
EINGOs X 1995	0.001		0.0039	0.000
EINGOs X 1996	0.006	(*)	0.0034	0.006
EINGOs X 1997	0.005		0.0034	0.000
EINGOs X 1998	0.006	(*)	0.0035	0.006
EINGOs X 1999	0.006		0.0036	0.000
EINGOs X 2000	0.006		0.0042	0.000
EINGOs X 2001	0.007	(*)	0.0042	0.007

Table 4 Continued

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.009	(*)	0.0044	0.009
EINGOs X 2003	0.012	**	0.0045	0.012
EINGOs X 2004	0.013	**	0.0042	0.013
EINGOs X 2005	0.013	**	0.0040	0.013
EINGOs X 2006	0.011	**	0.0041	0.011
EINGOs X 2007	0.012	**	0.0038	0.012
EINGOs X 2008	0.010	**	0.0037	0.010
EINGOs X 2009	0.006		0.0037	0.000
EINGOs X 2010	0.009	*	0.0037	0.009
EINGOs X 2011	0.007	(*)	0.0034	0.007

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.040	*	0.0199	
IGOs	-0.021	(*)	0.0114	-0.041
IGOs X 1991	0.001		0.0021	-0.021
IGOs X 1992	-0.005	(*)	0.0029	-0.025
IGOs X 1993	-0.002		0.0036	-0.021
IGOs X 1994	0.003		0.0040	-0.021
IGOs X 1995	0.008	(*)	0.0045	-0.013
IGOs X 1996	0.026	***	0.0057	0.005
IGOs X 1997	0.025	***	0.0061	0.004
IGOs X 1998	0.031	***	0.0064	0.011
IGOs X 1999	0.033	***	0.0066	0.013
IGOs X 2000	0.032	***	0.0074	0.012
IGOs X 2001	0.039	***	0.0077	0.019
IGOs X 2002	0.047	***	0.0091	0.027
IGOs X 2003	0.062	***	0.0086	0.042
IGOs X 2004	0.063	***	0.0084	0.043
IGOs X 2005	0.064	***	0.0089	0.044
IGOs X 2006	0.074	***	0.0086	0.053
IGOs X 2007	0.081	***	0.0085	0.061
IGOs X 2008	0.078	***	0.0096	0.057
IGOs X 2009	0.076	***	0.0092	0.056
IGOs X 2010	0.093	***	0.0085	0.072
IGOs X 2011	0.088	***	0.0091	0.067
Number of Nations				81
Number of Observations				1782

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 5 Effect of World Society and Polity Integration on Production-Based CIWB, 52 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.015		0.0222	
INGOs	0.000		0.0213	0.000
INGOs X 1991	-0.005	***	0.0008	-0.005
INGOs X 1992	-0.006	***	0.0010	-0.006
INGOs X 1993	-0.004	**	0.0012	-0.004
INGOs X 1994	-0.001		0.0017	0.000
INGOs X 1995	0.008	***	0.0017	0.008
INGOs X 1996	0.017	***	0.0017	0.017
INGOs X 1997	0.024	***	0.0019	0.024
INGOs X 1998	0.028	***	0.0020	0.028
INGOs X 1999	0.030	***	0.0022	0.030
INGOs X 2000	0.034	***	0.0024	0.034
INGOs X 2001	0.037	***	0.0024	0.037
INGOs X 2002	0.042	***	0.0025	0.042
INGOs X 2003	0.049	***	0.0027	0.049
INGOs X 2004	0.055	***	0.0030	0.055
INGOs X 2005	0.062	***	0.0031	0.062
INGOs X 2006	0.067	***	0.0033	0.067
INGOs X 2007	0.074	***	0.0035	0.074
INGOs X 2008	0.080	***	0.0035	0.080
INGOs X 2009	0.078	***	0.0035	0.078
INGOs X 2010	0.083	***	0.0038	0.083
INGOs X 2011	0.087	***	0.0041	0.087

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.022		0.0236	
EINGOs	0.001		0.0069	0.000
EINGOs X 1991	-0.002		0.0033	0.000
EINGOs X 1992	-0.003		0.0043	0.000
EINGOs X 1993	-0.002		0.0051	0.000
EINGOs X 1994	-0.002		0.0061	0.000
EINGOs X 1995	0.000		0.0075	0.000
EINGOs X 1996	0.004		0.0066	0.000
EINGOs X 1997	0.007		0.0067	0.000
EINGOs X 1998	0.008		0.0070	0.000
EINGOs X 1999	0.007		0.0076	0.000
EINGOs X 2000	0.008		0.0096	0.000
EINGOs X 2001	0.009		0.0100	0.000

Table 5 Continued

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.010		0.0108	0.000
EINGOs X 2003	0.012		0.0110	0.000
EINGOs X 2004	0.013		0.0089	0.000
EINGOs X 2005	0.016	(*)	0.0089	0.016
EINGOs X 2006	0.019	*	0.0094	0.019
EINGOs X 2007	0.022	*	0.0087	0.022
EINGOs X 2008	0.026	**	0.0090	0.026
EINGOs X 2009	0.023	**	0.0089	0.023
EINGOs X 2010	0.026	**	0.0080	0.026
EINGOs X 2011	0.027	***	0.0074	0.027

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.023		0.0229	
IGOs	-0.042	*	0.0175	-0.042
IGOs X 1991	-0.007	(*)	0.0039	-0.049
IGOs X 1992	-0.008		0.0051	-0.042
IGOs X 1993	-0.004		0.0062	-0.042
IGOs X 1994	0.001		0.0070	-0.042
IGOs X 1995	0.014	(*)	0.0080	-0.029
IGOs X 1996	0.030	**	0.0103	-0.012
IGOs X 1997	0.044	***	0.0111	0.002
IGOs X 1998	0.053	***	0.0117	0.011
IGOs X 1999	0.059	***	0.0135	0.017
IGOs X 2000	0.066	***	0.0147	0.023
IGOs X 2001	0.073	***	0.0144	0.031
IGOs X 2002	0.079	***	0.0161	0.037
IGOs X 2003	0.090	***	0.0166	0.048
IGOs X 2004	0.101	***	0.0162	0.059
IGOs X 2005	0.113	***	0.0179	0.071
IGOs X 2006	0.125	***	0.0180	0.082
IGOs X 2007	0.140	***	0.0172	0.098
IGOs X 2008	0.156	***	0.0201	0.114
IGOs X 2009	0.165	***	0.0189	0.123
IGOs X 2010	0.186	***	0.0168	0.144
IGOs X 2011	0.202	***	0.0183	0.159
Number of Nations				52
Number of Observations				1144

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 6 Effect of World Society and Polity Integration on Production-Based CIWB, 29 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.113	***	0.0188	
INGOs	-0.001		0.0196	0.000
INGOs X 1991	-0.002	***	0.0005	-0.002
INGOs X 1992	0.000		0.0009	0.000
INGOs X 1993	0.008	***	0.0013	0.008
INGOs X 1994	0.011	***	0.0011	0.011
INGOs X 1995	0.008	***	0.0013	0.008
INGOs X 1996	0.011	***	0.0014	0.011
INGOs X 1997	0.006	***	0.0014	0.006
INGOs X 1998	0.005	***	0.0012	0.005
INGOs X 1999	-0.001		0.0012	0.000
INGOs X 2000	-0.004	**	0.0013	-0.004
INGOs X 2001	-0.006	***	0.0014	-0.006
INGOs X 2002	-0.008	***	0.0014	-0.008
INGOs X 2003	-0.004	**	0.0013	-0.004
INGOs X 2004	-0.005	***	0.0013	-0.005
INGOs X 2005	-0.010	***	0.0015	-0.010
INGOs X 2006	-0.026	***	0.0016	-0.026
INGOs X 2007	-0.031	***	0.0018	-0.031
INGOs X 2008	-0.047	***	0.0019	-0.047
INGOs X 2009	-0.053	***	0.0021	-0.053
INGOs X 2010	-0.052	***	0.0023	-0.052
INGOs X 2011	-0.057	***	0.0024	-0.057

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.111	***	0.0194	
EINGOs	0.009		0.0062	0.000
EINGOs X 1991	0.000		0.0020	0.000
EINGOs X 1992	0.004		0.0033	0.000
EINGOs X 1993	0.007	*	0.0034	0.007
EINGOs X 1994	0.007	*	0.0033	0.007
EINGOs X 1995	0.003		0.0036	0.000
EINGOs X 1996	0.006		0.0039	0.000
EINGOs X 1997	0.000		0.0035	0.000
EINGOs X 1998	0.000		0.0033	0.000
EINGOs X 1999	-0.006	*	0.0029	-0.006
EINGOs X 2000	-0.006	*	0.0028	-0.006
EINGOs X 2001	-0.008	**	0.0027	-0.008

Table 6 Continued

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	-0.008	**	0.0026	-0.008
EINGOs X 2003	-0.006	*	0.0027	-0.006
EINGOs X 2004	-0.006	*	0.0028	-0.006
EINGOs X 2005	-0.009	**	0.0027	-0.009
EINGOs X 2006	-0.019	***	0.0027	-0.019
EINGOs X 2007	-0.021	***	0.0028	-0.021
EINGOs X 2008	-0.032	***	0.0030	-0.032
EINGOs X 2009	-0.036	***	0.0032	-0.036
EINGOs X 2010	-0.040	***	0.0036	-0.040
EINGOs X 2011	-0.043	***	0.0037	-0.043

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.114	***	0.0207	
IGOs	-0.020		0.0163	0.000
IGOs X 1991	0.011	***	0.0031	0.011
IGOs X 1992	0.005		0.0044	0.000
IGOs X 1993	0.015	**	0.0050	0.015
IGOs X 1994	0.018	**	0.0056	0.018
IGOs X 1995	0.006		0.0061	0.000
IGOs X 1996	0.019	**	0.0066	0.019
IGOs X 1997	0.001		0.0066	0.000
IGOs X 1998	0.002		0.0063	0.000
IGOs X 1999	-0.011	(*)	0.0064	-0.011
IGOs X 2000	-0.022	**	0.0066	-0.022
IGOs X 2001	-0.023	**	0.0068	-0.023
IGOs X 2002	-0.020	**	0.0067	-0.020
IGOs X 2003	-0.006		0.0066	0.000
IGOs X 2004	-0.014	*	0.0065	-0.014
IGOs X 2005	-0.022	**	0.0065	-0.022
IGOs X 2006	-0.022	***	0.0063	-0.022
IGOs X 2007	-0.030	***	0.0064	-0.030
IGOs X 2008	-0.066	***	0.0065	-0.066
IGOs X 2009	-0.070	***	0.0071	-0.070
IGOs X 2010	-0.069	***	0.0082	-0.069
IGOs X 2011	-0.087	***	0.0083	-0.087
Number of Nations				29
Number of Observations				638

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 7 Effect of World Society and Polity Integration on Production-Based CIWB, 16 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.070	***	0.0104	
INGOs	-0.013		0.0098	0.000
INGOs X 1991	0.003	***	0.0005	0.003
INGOs X 1992	0.005	***	0.0008	0.005
INGOs X 1993	0.005	***	0.0009	0.005
INGOs X 1994	0.005	***	0.0010	0.005
INGOs X 1995	0.005	***	0.0010	0.005
INGOs X 1996	0.009	***	0.0011	0.009
INGOs X 1997	0.010	***	0.0011	0.010
INGOs X 1998	0.010	***	0.0012	0.010
INGOs X 1999	0.011	***	0.0012	0.011
INGOs X 2000	0.008	***	0.0013	0.008
INGOs X 2001	0.005	***	0.0014	0.005
INGOs X 2002	0.005	**	0.0014	0.005
INGOs X 2003	0.003	(*)	0.0015	0.003
INGOs X 2004	0.005	**	0.0015	0.005
INGOs X 2005	0.003	(*)	0.0015	0.003
INGOs X 2006	0.002		0.0015	0.000
INGOs X 2007	0.004	*	0.0016	0.004
INGOs X 2008	0.007	***	0.0016	0.007
INGOs X 2009	0.004	*	0.0016	0.004
INGOs X 2010	0.004	*	0.0015	0.004
INGOs X 2011	0.005	**	0.0016	0.005

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.066	***	0.0088	
EINGOs	-0.001		0.0025	0.000
EINGOs X 1991	0.002	(*)	0.0012	0.002
EINGOs X 1992	0.002		0.0015	0.000
EINGOs X 1993	0.001		0.0017	0.000
EINGOs X 1994	0.002		0.0020	0.000
EINGOs X 1995	0.000		0.0021	0.000
EINGOs X 1996	0.002		0.0025	0.000
EINGOs X 1997	0.003		0.0030	0.000
EINGOs X 1998	0.002		0.0031	0.000
EINGOs X 1999	0.002		0.0029	0.000
EINGOs X 2000	0.002		0.0033	0.000
EINGOs X 2001	-0.002		0.0034	0.000

Table 7 Continued

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	-0.002		0.0038	0.000
EINGOs X 2003	-0.005		0.0039	0.000
EINGOs X 2004	-0.004		0.0036	0.000
EINGOs X 2005	-0.004		0.0034	0.000
EINGOs X 2006	-0.006		0.0034	-0.006
EINGOs X 2007	-0.005		0.0035	0.000
EINGOs X 2008	-0.004		0.0036	0.000
EINGOs X 2009	-0.008	*	0.0036	-0.008
EINGOs X 2010	-0.006	(*)	0.0033	-0.006
EINGOs X 2011	-0.004		0.0029	0.000

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.069	***	0.0092	
IGOs	0.008		0.0099	0.000
IGOs X 1991	0.005		0.0035	0.000
IGOs X 1992	0.006		0.0045	0.000
IGOs X 1993	0.014	*	0.0054	0.014
IGOs X 1994	0.013	*	0.0059	0.013
IGOs X 1995	0.010		0.0070	0.000
IGOs X 1996	0.014	(*)	0.0082	0.014
IGOs X 1997	0.012		0.0080	0.000
IGOs X 1998	0.011		0.0085	0.000
IGOs X 1999	0.003		0.0093	0.000
IGOs X 2000	0.012		0.0098	0.000
IGOs X 2001	0.008		0.0100	0.000
IGOs X 2002	0.009		0.0096	0.000
IGOs X 2003	0.008		0.0106	0.000
IGOs X 2004	0.011		0.0106	0.000
IGOs X 2005	0.009		0.0110	0.000
IGOs X 2006	0.004		0.0111	0.000
IGOs X 2007	0.000		0.0115	0.000
IGOs X 2008	0.004		0.0117	0.000
IGOs X 2009	0.005		0.0123	0.000
IGOs X 2010	0.014		0.0140	0.000
IGOs X 2011	0.007		0.0139	0.000
Number of Nations				16
Number of Observations				352

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 8 Effect of World Society and Polity Integration on Production-Based CIWB, 24 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.058	**	0.0205	
INGOs	-0.016		0.0197	0.000
INGOs X 1991	0.010	***	0.0012	0.010
INGOs X 1992	-0.004	*	0.0021	-0.004
INGOs X 1993	-0.007	*	0.0027	-0.007
INGOs X 1994	-0.015	***	0.0031	-0.015
INGOs X 1995	-0.021	***	0.0038	-0.021
INGOs X 1996	-0.017	***	0.0045	-0.017
INGOs X 1997	-0.039	***	0.0049	-0.039
INGOs X 1998	-0.022	***	0.0042	-0.022
INGOs X 1999	-0.035	***	0.0045	-0.035
INGOs X 2000	-0.044	***	0.0049	-0.044
INGOs X 2001	-0.040	***	0.0051	-0.040
INGOs X 2002	-0.035	***	0.0055	-0.035
INGOs X 2003	-0.024	***	0.0059	-0.024
INGOs X 2004	-0.030	***	0.0062	-0.030
INGOs X 2005	-0.033	***	0.0068	-0.033
INGOs X 2006	-0.027	***	0.0070	-0.027
INGOs X 2007	-0.040	***	0.0075	-0.040
INGOs X 2008	-0.055	***	0.0078	-0.055
INGOs X 2009	-0.063	***	0.0087	-0.063
INGOs X 2010	-0.062	***	0.0092	-0.062
INGOs X 2011	-0.086	***	0.0096	-0.086

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.048	**	0.0177	
EINGOs	0.024	*	0.0102	0.024
EINGOs X 1991	0.006		0.0043	0.024
EINGOs X 1992	-0.004		0.0065	0.024
EINGOs X 1993	-0.010		0.0076	0.024
EINGOs X 1994	-0.016	*	0.0075	0.008
EINGOs X 1995	-0.017	*	0.0084	0.006
EINGOs X 1996	-0.013		0.0087	0.024
EINGOs X 1997	-0.032	***	0.0083	-0.009
EINGOs X 1998	-0.012		0.0088	0.024
EINGOs X 1999	-0.025	**	0.0083	-0.002
EINGOs X 2000	-0.033	***	0.0088	-0.010
EINGOs X 2001	-0.033	***	0.0085	-0.010

Table 8 Continued

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	-0.031	***	0.0085	-0.008
EINGOs X 2003	-0.027	**	0.0087	-0.003
EINGOs X 2004	-0.033	***	0.0087	-0.009
EINGOs X 2005	-0.034	***	0.0090	-0.010
EINGOs X 2006	-0.022	*	0.0094	0.002
EINGOs X 2007	-0.031	**	0.0105	-0.008
EINGOs X 2008	-0.056	***	0.0107	-0.032
EINGOs X 2009	-0.065	***	0.0110	-0.041
EINGOs X 2010	-0.067	***	0.0114	-0.044
EINGOs X 2011	-0.089	***	0.0118	-0.065

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.085	***	0.0186	
IGOs	-0.006		0.0151	0.000
IGOs X 1991	0.014	***	0.0031	0.014
IGOs X 1992	-0.005		0.0055	0.000
IGOs X 1993	0.001		0.0047	0.000
IGOs X 1994	0.002		0.0055	0.000
IGOs X 1995	-0.014	*	0.0059	-0.014
IGOs X 1996	0.004		0.0064	0.000
IGOs X 1997	-0.026	***	0.0069	-0.026
IGOs X 1998	-0.016	*	0.0070	-0.016
IGOs X 1999	-0.025	**	0.0079	-0.025
IGOs X 2000	-0.047	***	0.0080	-0.047
IGOs X 2001	-0.043	***	0.0084	-0.043
IGOs X 2002	-0.037	***	0.0086	-0.037
IGOs X 2003	-0.017	(*)	0.0084	-0.017
IGOs X 2004	-0.026	**	0.0086	-0.026
IGOs X 2005	-0.037	***	0.0090	-0.037
IGOs X 2006	-0.003		0.0091	0.000
IGOs X 2007	-0.017	(*)	0.0091	-0.017
IGOs X 2008	-0.054	***	0.0089	-0.054
IGOs X 2009	-0.048	***	0.0094	-0.048
IGOs X 2010	-0.040	***	0.0099	-0.040
IGOs X 2011	-0.066	***	0.0101	-0.066
Number of Nations				24
Number of Observations				528

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 9 Effect of World Society and Polity Integration on Production-Based CIWB with Infant Survival, 81 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.003		0.0028	
INGOs	0.002		0.0033	0.000
INGOs X 1991	0.001	***	0.0001	0.001
INGOs X 1992	0.001	***	0.0002	0.001
INGOs X 1993	0.002	***	0.0002	0.002
INGOs X 1994	0.003	***	0.0002	0.003
INGOs X 1995	0.004	***	0.0002	0.004
INGOs X 1996	0.006	***	0.0002	0.006
INGOs X 1997	0.006	***	0.0002	0.006
INGOs X 1998	0.007	***	0.0002	0.007
INGOs X 1999	0.008	***	0.0002	0.008
INGOs X 2000	0.009	***	0.0003	0.009
INGOs X 2001	0.010	***	0.0003	0.010
INGOs X 2002	0.011	***	0.0003	0.011
INGOs X 2003	0.013	***	0.0003	0.013
INGOs X 2004	0.015	***	0.0003	0.015
INGOs X 2005	0.015	***	0.0003	0.015
INGOs X 2006	0.016	***	0.0003	0.016
INGOs X 2007	0.017	***	0.0003	0.017
INGOs X 2008	0.016	***	0.0002	0.016
INGOs X 2009	0.015	***	0.0002	0.015
INGOs X 2010	0.017	***	0.0002	0.017
INGOs X 2011	0.017	***	0.0002	0.017

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.004		0.0031	
EINGOs	-0.002	**	0.0009	-0.002
EINGOs X 1991	0.001		0.0005	-0.002
EINGOs X 1992	0.001		0.0007	-0.002
EINGOs X 1993	0.001		0.0007	-0.002
EINGOs X 1994	0.001	(*)	0.0008	-0.001
EINGOs X 1995	0.002	(*)	0.0009	-0.001
EINGOs X 1996	0.003	**	0.0009	0.001
EINGOs X 1997	0.003	**	0.0009	0.000
EINGOs X 1998	0.003	**	0.0009	0.001
EINGOs X 1999	0.003	***	0.0009	0.001
EINGOs X 2000	0.004	***	0.0010	0.002
EINGOs X 2001	0.005	***	0.0011	0.003

Table 9 Continued

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.006	***	0.0011	0.004
EINGOs X 2003	0.008	***	0.0012	0.005
EINGOs X 2004	0.008	***	0.0014	0.006
EINGOs X 2005	0.009	***	0.0013	0.006
EINGOs X 2006	0.009	***	0.0012	0.006
EINGOs X 2007	0.009	***	0.0013	0.007
EINGOs X 2008	0.009	***	0.0013	0.006
EINGOs X 2009	0.008	***	0.0013	0.005
EINGOs X 2010	0.009	***	0.0013	0.007
EINGOs X 2011	0.009	***	0.0013	0.006

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.005	(*)	0.0031	
IGOs	-0.006	*	0.0024	-0.006
IGOs X 1991	0.002	***	0.0005	-0.004
IGOs X 1992	0.002	***	0.0006	-0.004
IGOs X 1993	0.003	***	0.0008	-0.003
IGOs X 1994	0.004	***	0.0010	-0.002
IGOs X 1995	0.004	**	0.0012	-0.002
IGOs X 1996	0.009	***	0.0014	0.002
IGOs X 1997	0.007	***	0.0015	0.001
IGOs X 1998	0.009	***	0.0016	0.002
IGOs X 1999	0.010	***	0.0017	0.003
IGOs X 2000	0.011	***	0.0020	0.004
IGOs X 2001	0.014	***	0.0020	0.008
IGOs X 2002	0.017	***	0.0020	0.011
IGOs X 2003	0.022	***	0.0021	0.016
IGOs X 2004	0.024	***	0.0019	0.018
IGOs X 2005	0.024	***	0.0020	0.018
IGOs X 2006	0.026	***	0.0020	0.020
IGOs X 2007	0.028	***	0.0020	0.022
IGOs X 2008	0.028	***	0.0022	0.021
IGOs X 2009	0.027	***	0.0023	0.020
IGOs X 2010	0.031	***	0.0025	0.024
IGOs X 2011	0.031	***	0.0024	0.025
Number of Nations				81
Number of Observations				1782

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 10 Effect of World Society and Polity Integration on Production-Based CIWB with Infant Survival, 52 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	-0.004		0.0027	
INGOs	-0.005		0.0036	0.000
INGOs X 1991	0.000		0.0001	0.000
INGOs X 1992	0.000		0.0002	0.000
INGOs X 1993	0.001	**	0.0002	0.001
INGOs X 1994	0.001	*	0.0003	0.001
INGOs X 1995	0.002	***	0.0003	0.002
INGOs X 1996	0.004	***	0.0003	0.004
INGOs X 1997	0.004	***	0.0003	0.004
INGOs X 1998	0.004	***	0.0004	0.004
INGOs X 1999	0.005	***	0.0004	0.005
INGOs X 2000	0.007	***	0.0004	0.007
INGOs X 2001	0.008	***	0.0004	0.008
INGOs X 2002	0.010	***	0.0004	0.010
INGOs X 2003	0.012	***	0.0005	0.012
INGOs X 2004	0.014	***	0.0005	0.014
INGOs X 2005	0.016	***	0.0005	0.016
INGOs X 2006	0.018	***	0.0005	0.018
INGOs X 2007	0.019	***	0.0005	0.019
INGOs X 2008	0.021	***	0.0005	0.021
INGOs X 2009	0.021	***	0.0005	0.021
INGOs X 2010	0.022	***	0.0006	0.022
INGOs X 2011	0.023	***	0.0006	0.023

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	-0.002		0.0030	
EINGOs	-0.001		0.0010	0.000
EINGOs X 1991	0.000		0.0006	0.000
EINGOs X 1992	0.000		0.0008	0.000
EINGOs X 1993	0.000		0.0008	0.000
EINGOs X 1994	0.000		0.0010	0.000
EINGOs X 1995	0.000		0.0011	0.000
EINGOs X 1996	0.001		0.0011	0.000
EINGOs X 1997	0.001		0.0012	0.000
EINGOs X 1998	0.001		0.0012	0.000
EINGOs X 1999	0.001		0.0012	0.000
EINGOs X 2000	0.001		0.0017	0.000
EINGOs X 2001	0.002		0.0017	0.000

Table 10 Continued

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.003		0.0019	0.000
EINGOs X 2003	0.004	*	0.0019	0.004
EINGOs X 2004	0.005	*	0.0019	0.005
EINGOs X 2005	0.006	**	0.0019	0.006
EINGOs X 2006	0.007	***	0.0017	0.007
EINGOs X 2007	0.008	***	0.0018	0.008
EINGOs X 2008	0.009	***	0.0019	0.009
EINGOs X 2009	0.009	***	0.0019	0.009
EINGOs X 2010	0.009	***	0.0017	0.009
EINGOs X 2011	0.010	***	0.0016	0.010

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	-0.002		0.0030	
IGOs	-0.003		0.0030	0.000
IGOs X 1991	0.000		0.0007	0.000
IGOs X 1992	0.001		0.0009	0.000
IGOs X 1993	0.002		0.0012	0.000
IGOs X 1994	0.000		0.0014	0.000
IGOs X 1995	0.001		0.0018	0.000
IGOs X 1996	0.004	(*)	0.0020	0.004
IGOs X 1997	0.004	(*)	0.0021	0.004
IGOs X 1998	0.003		0.0023	0.000
IGOs X 1999	0.004		0.0027	0.000
IGOs X 2000	0.006	(*)	0.0031	0.006
IGOs X 2001	0.008	**	0.0030	0.008
IGOs X 2002	0.010	**	0.0031	0.010
IGOs X 2003	0.013	***	0.0035	0.013
IGOs X 2004	0.016	***	0.0031	0.016
IGOs X 2005	0.019	***	0.0033	0.019
IGOs X 2006	0.021	***	0.0035	0.021
IGOs X 2007	0.024	***	0.0033	0.024
IGOs X 2008	0.026	***	0.0036	0.026
IGOs X 2009	0.026	***	0.0039	0.026
IGOs X 2010	0.030	***	0.0041	0.030
IGOs X 2011	0.033	***	0.0042	0.033
Number of Nations				52
Number of Observations				1144

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 11 Effect of World Society and Polity Integration on Production-Based CIWB with Infant Survival, 29 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.035	***	0.0045	
INGOs	0.002		0.0050	0.000
INGOs X 1991	0.000		0.0001	0.000
INGOs X 1992	0.001	***	0.0003	0.001
INGOs X 1993	0.003	***	0.0003	0.003
INGOs X 1994	0.005	***	0.0003	0.005
INGOs X 1995	0.004	***	0.0003	0.004
INGOs X 1996	0.005	***	0.0004	0.005
INGOs X 1997	0.004	***	0.0004	0.004
INGOs X 1998	0.004	***	0.0003	0.004
INGOs X 1999	0.003	***	0.0003	0.003
INGOs X 2000	0.002	***	0.0003	0.002
INGOs X 2001	0.002	***	0.0004	0.002
INGOs X 2002	0.001	*	0.0004	0.001
INGOs X 2003	0.002	***	0.0004	0.002
INGOs X 2004	0.002	***	0.0003	0.002
INGOs X 2005	0.001		0.0004	0.000
INGOs X 2006	-0.003	***	0.0004	-0.003
INGOs X 2007	-0.005	***	0.0005	-0.005
INGOs X 2008	-0.009	***	0.0005	-0.009
INGOs X 2009	-0.010	***	0.0005	-0.010
INGOs X 2010	-0.010	***	0.0006	-0.010
INGOs X 2011	-0.010	***	0.0006	-0.010

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.035	***	0.0047	
EINGOs	0.001		0.0016	0.000
EINGOs X 1991	0.001		0.0005	0.000
EINGOs X 1992	0.002	(*)	0.0009	0.002
EINGOs X 1993	0.003	***	0.0009	0.003
EINGOs X 1994	0.004	***	0.0008	0.004
EINGOs X 1995	0.003	**	0.0009	0.003
EINGOs X 1996	0.004	***	0.0010	0.004
EINGOs X 1997	0.002	**	0.0009	0.002
EINGOs X 1998	0.002	**	0.0008	0.002
EINGOs X 1999	0.001		0.0007	0.000
EINGOs X 2000	0.001		0.0007	0.000
EINGOs X 2001	0.000		0.0007	0.000

Table 11 Continued

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.000		0.0007	0.000
EINGOs X 2003	0.001		0.0007	0.000
EINGOs X 2004	0.001		0.0007	0.000
EINGOs X 2005	0.000		0.0007	0.000
EINGOs X 2006	-0.003	***	0.0007	-0.003
EINGOs X 2007	-0.003	***	0.0007	-0.003
EINGOs X 2008	-0.006	***	0.0008	-0.006
EINGOs X 2009	-0.007	***	0.0008	-0.007
EINGOs X 2010	-0.008	***	0.0010	-0.008
EINGOs X 2011	-0.008	***	0.0010	-0.008

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.036	***	0.0051	
IGOs	-0.006		0.0040	0.000
IGOs X 1991	0.003	***	0.0007	0.003
IGOs X 1992	0.003	**	0.0011	0.003
IGOs X 1993	0.005	***	0.0013	0.005
IGOs X 1994	0.008	***	0.0014	0.008
IGOs X 1995	0.004	**	0.0015	0.004
IGOs X 1996	0.008	***	0.0017	0.008
IGOs X 1997	0.004	*	0.0017	0.004
IGOs X 1998	0.004	*	0.0017	0.004
IGOs X 1999	0.000		0.0017	0.000
IGOs X 2000	-0.003		0.0019	0.000
IGOs X 2001	-0.003		0.0019	0.000
IGOs X 2002	-0.003		0.0019	0.000
IGOs X 2003	0.000		0.0018	0.000
IGOs X 2004	-0.001		0.0018	0.000
IGOs X 2005	-0.003	*	0.0017	-0.003
IGOs X 2006	-0.006	***	0.0016	-0.006
IGOs X 2007	-0.008	***	0.0017	-0.008
IGOs X 2008	-0.014	***	0.0017	-0.014
IGOs X 2009	-0.014	***	0.0018	-0.014
IGOs X 2010	-0.014	***	0.0020	-0.014
IGOs X 2011	-0.015	***	0.0020	-0.015
Number of Nations				29
Number of Observations				638

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 12 Effect of World Society and Polity Integration on Consumption-Based CIWB, 81 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.029		0.0208	
INGOs	-0.004		0.0199	0.000
INGOs X 1991	-0.003	***	0.0006	-0.003
INGOs X 1992	0.007	***	0.0009	0.007
INGOs X 1993	-0.002	*	0.0010	-0.002
INGOs X 1994	-0.004	***	0.0011	-0.004
INGOs X 1995	0.001		0.0011	0.000
INGOs X 1996	0.007	***	0.0011	0.007
INGOs X 1997	0.008	***	0.0010	0.008
INGOs X 1998	0.011	***	0.0011	0.011
INGOs X 1999	0.016	***	0.0011	0.016
INGOs X 2000	0.016	***	0.0012	0.016
INGOs X 2001	0.017	***	0.0011	0.017
INGOs X 2002	0.020	***	0.0012	0.020
INGOs X 2003	0.023	***	0.0012	0.023
INGOs X 2004	0.029	***	0.0012	0.029
INGOs X 2005	0.032	***	0.0012	0.032
INGOs X 2006	0.035	***	0.0012	0.035
INGOs X 2007	0.036	***	0.0013	0.036
INGOs X 2008	0.038	***	0.0011	0.038
INGOs X 2009	0.032	***	0.0012	0.032
INGOs X 2010	0.039	***	0.0013	0.039
INGOs X 2011	0.042	***	0.0014	0.042

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.030		0.0212	
EINGOs	-0.007		0.0058	0.000
EINGOs X 1991	-0.002		0.0023	0.000
EINGOs X 1992	0.008	*	0.0031	0.008
EINGOs X 1993	-0.001		0.0036	0.000
EINGOs X 1994	-0.003		0.0041	0.000
EINGOs X 1995	0.000		0.0048	0.000
EINGOs X 1996	0.005		0.0045	0.000
EINGOs X 1997	0.003		0.0045	0.000
EINGOs X 1998	0.006		0.0045	0.000
EINGOs X 1999	0.011	*	0.0046	0.011
EINGOs X 2000	0.007		0.0054	0.000
EINGOs X 2001	0.013	*	0.0054	0.013

Table 12 Continued

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.016	**	0.0056	0.016
EINGOs X 2003	0.013	*	0.0057	0.013
EINGOs X 2004	0.017	**	0.0052	0.017
EINGOs X 2005	0.015	**	0.0051	0.015
EINGOs X 2006	0.016	**	0.0052	0.016
EINGOs X 2007	0.023	***	0.0049	0.023
EINGOs X 2008	0.027	***	0.0049	0.027
EINGOs X 2009	0.017	**	0.0049	0.017
EINGOs X 2010	0.026	***	0.0048	0.026
EINGOs X 2011	0.028	***	0.0045	0.028

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.037	(*)	0.0210	
IGOs	-0.029	(*)	0.0154	-0.029
IGOs X 1991	-0.007	**	0.0022	-0.035
IGOs X 1992	0.014	***	0.0029	-0.014
IGOs X 1993	-0.002		0.0036	-0.029
IGOs X 1994	-0.011	*	0.0041	-0.039
IGOs X 1995	0.000		0.0048	-0.029
IGOs X 1996	0.008		0.0057	-0.029
IGOs X 1997	0.004		0.0061	-0.029
IGOs X 1998	0.025	***	0.0064	-0.004
IGOs X 1999	0.028	***	0.0071	-0.001
IGOs X 2000	0.023	**	0.0082	-0.005
IGOs X 2001	0.034	***	0.0085	0.005
IGOs X 2002	0.047	***	0.0099	0.018
IGOs X 2003	0.053	***	0.0093	0.024
IGOs X 2004	0.065	***	0.0087	0.036
IGOs X 2005	0.064	***	0.0091	0.035
IGOs X 2006	0.076	***	0.0088	0.048
IGOs X 2007	0.098	***	0.0088	0.070
IGOs X 2008	0.104	***	0.0096	0.075
IGOs X 2009	0.087	***	0.0098	0.058
IGOs X 2010	0.124	***	0.0095	0.095
IGOs X 2011	0.128	***	0.0099	0.100
Number of Nations				81
Number of Observations				1782

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 13 Effect of World Society and Polity Integration on Consumption-Based CIWB, 52 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.006		0.0228	
INGOs	0.003		0.0212	0.000
INGOs X 1991	-0.005	***	0.0009	-0.005
INGOs X 1992	-0.002		0.0011	0.000
INGOs X 1993	-0.001		0.0014	0.000
INGOs X 1994	0.000		0.0018	0.000
INGOs X 1995	0.007	***	0.0018	0.007
INGOs X 1996	0.012	***	0.0018	0.012
INGOs X 1997	0.020	***	0.0019	0.020
INGOs X 1998	0.024	***	0.0019	0.024
INGOs X 1999	0.027	***	0.0020	0.027
INGOs X 2000	0.031	***	0.0022	0.031
INGOs X 2001	0.033	***	0.0021	0.033
INGOs X 2002	0.037	***	0.0022	0.037
INGOs X 2003	0.045	***	0.0023	0.045
INGOs X 2004	0.052	***	0.0025	0.052
INGOs X 2005	0.059	***	0.0026	0.059
INGOs X 2006	0.065	***	0.0028	0.065
INGOs X 2007	0.071	***	0.0030	0.071
INGOs X 2008	0.076	***	0.0029	0.076
INGOs X 2009	0.075	***	0.0029	0.075
INGOs X 2010	0.082	***	0.0032	0.082
INGOs X 2011	0.086	***	0.0034	0.086

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.016		0.0237	
EINGOs	-0.003		0.0065	0.000
EINGOs X 1991	-0.001		0.0028	0.000
EINGOs X 1992	0.003		0.0039	0.000
EINGOs X 1993	0.003		0.0048	0.000
EINGOs X 1994	0.001		0.0058	0.000
EINGOs X 1995	0.002		0.0071	0.000
EINGOs X 1996	0.004		0.0062	0.000
EINGOs X 1997	0.008		0.0062	0.000
EINGOs X 1998	0.010		0.0065	0.000
EINGOs X 1999	0.011		0.0071	0.000
EINGOs X 2000	0.012		0.0090	0.000
EINGOs X 2001	0.013		0.0095	0.000

Table 13 Continued

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.014		0.0102	0.000
EINGOs X 2003	0.018	(*)	0.0103	0.018
EINGOs X 2004	0.019	*	0.0083	0.019
EINGOs X 2005	0.023	**	0.0083	0.023
EINGOs X 2006	0.026	**	0.0088	0.026
EINGOs X 2007	0.029	***	0.0081	0.029
EINGOs X 2008	0.032	***	0.0083	0.032
EINGOs X 2009	0.029	***	0.0082	0.029
EINGOs X 2010	0.034	***	0.0073	0.034
EINGOs X 2011	0.034	***	0.0067	0.034

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.016		0.0231	
IGOs	-0.044	*	0.0189	-0.044
IGOs X 1991	-0.010	*	0.0042	-0.054
IGOs X 1992	-0.003		0.0055	-0.044
IGOs X 1993	0.000		0.0066	-0.044
IGOs X 1994	-0.001		0.0075	-0.044
IGOs X 1995	0.012		0.0084	-0.044
IGOs X 1996	0.023	*	0.0104	-0.020
IGOs X 1997	0.037	**	0.0111	-0.006
IGOs X 1998	0.047	***	0.0115	0.004
IGOs X 1999	0.052	***	0.0132	0.009
IGOs X 2000	0.058	***	0.0141	0.015
IGOs X 2001	0.066	***	0.0139	0.022
IGOs X 2002	0.074	***	0.0154	0.030
IGOs X 2003	0.088	***	0.0159	0.045
IGOs X 2004	0.100	***	0.0155	0.057
IGOs X 2005	0.114	***	0.0170	0.071
IGOs X 2006	0.127	***	0.0170	0.084
IGOs X 2007	0.145	***	0.0162	0.101
IGOs X 2008	0.160	***	0.0189	0.117
IGOs X 2009	0.165	***	0.0176	0.121
IGOs X 2010	0.193	***	0.0157	0.150
IGOs X 2011	0.208	***	0.0168	0.164
Number of Nations				52
Number of Observations				1144

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 14 Effect of World Society and Polity Integration on Consumption-Based CIWB, 29 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.135	***	0.0337	
INGOs	-0.054		0.0368	0.000
INGOs X 1991	-0.001		0.0009	0.000
INGOs X 1992	0.014	***	0.0016	0.014
INGOs X 1993	-0.007	**	0.0022	-0.007
INGOs X 1994	-0.014	***	0.0020	-0.014
INGOs X 1995	-0.008	**	0.0024	-0.008
INGOs X 1996	0.001		0.0025	0.000
INGOs X 1997	-0.001		0.0025	0.000
INGOs X 1998	0.001		0.0022	0.000
INGOs X 1999	0.026	***	0.0021	0.026
INGOs X 2000	0.010	***	0.0023	0.010
INGOs X 2001	0.022	***	0.0025	0.022
INGOs X 2002	0.024	***	0.0024	0.024
INGOs X 2003	0.003		0.0023	0.000
INGOs X 2004	0.011	***	0.0023	0.011
INGOs X 2005	0.003		0.0028	0.000
INGOs X 2006	-0.006	*	0.0028	-0.006
INGOs X 2007	-0.007	*	0.0031	-0.007
INGOs X 2008	0.003		0.0034	0.000
INGOs X 2009	-0.009	*	0.0038	-0.009
INGOs X 2010	-0.008	(*)	0.0042	-0.008
INGOs X 2011	0.000		0.0043	0.000

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.134	***	0.0345	
EINGOs	-0.013		0.0145	0.000
EINGOs X 1991	-0.004		0.0054	0.000
EINGOs X 1992	0.007		0.0071	0.000
EINGOs X 1993	-0.012	(*)	0.0074	-0.012
EINGOs X 1994	-0.016	*	0.0071	-0.016
EINGOs X 1995	-0.008		0.0074	0.000
EINGOs X 1996	-0.001		0.0074	0.000
EINGOs X 1997	-0.007		0.0069	0.000
EINGOs X 1998	-0.002		0.0064	0.000
EINGOs X 1999	0.018	**	0.0059	0.018
EINGOs X 2000	0.003		0.0058	0.000
EINGOs X 2001	0.018	**	0.0056	0.018

Table 14 Continued

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
EINGOs X 2002	0.021	***	0.0055	0.021
EINGOs X 2003	0.003		0.0056	0.000
EINGOs X 2004	0.007		0.0058	0.000
EINGOs X 2005	-0.005		0.0058	0.000
EINGOs X 2006	-0.013	*	0.0057	-0.013
EINGOs X 2007	0.005		0.0058	0.000
EINGOs X 2008	0.015	*	0.0061	0.015
EINGOs X 2009	0.001		0.0065	0.000
EINGOs X 2010	0.010		0.0070	0.000
EINGOs X 2011	0.015	*	0.0069	0.015

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.138	***	0.0341	
IGOs	-0.036		0.0245	0.000
IGOs X 1991	0.001		0.0048	0.000
IGOs X 1992	0.037	***	0.0060	0.037
IGOs X 1993	-0.002		0.0074	0.000
IGOs X 1994	-0.025	**	0.0079	-0.025
IGOs X 1995	-0.017	*	0.0084	-0.017
IGOs X 1996	-0.025	**	0.0086	-0.025
IGOs X 1997	-0.048	***	0.0093	-0.048
IGOs X 1998	-0.012		0.0082	0.000
IGOs X 1999	0.008		0.0078	0.000
IGOs X 2000	-0.027	**	0.0084	-0.027
IGOs X 2001	0.007		0.0083	0.000
IGOs X 2002	0.021	*	0.0088	0.021
IGOs X 2003	-0.005		0.0083	0.000
IGOs X 2004	0.004		0.0081	0.000
IGOs X 2005	-0.027	**	0.0082	-0.027
IGOs X 2006	-0.025	**	0.0082	-0.025
IGOs X 2007	0.021	*	0.0086	0.021
IGOs X 2008	0.028	**	0.0089	0.028
IGOs X 2009	-0.002		0.0101	0.000
IGOs X 2010	0.041	***	0.0114	0.041
IGOs X 2011	0.037	**	0.0117	0.037
Number of Nations				29
Number of Observations				638

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

CHAPTER 3

GLOBAL ECONOMIC INTEGRATION, ECOLOGICALLY UNEQUAL EXCHANGE, AND THE CIWB OF NATIONS

Reducing carbon emissions is necessary for the well-being of life on our planet; however, carbon emissions are linked to economic development and human well-being. This link is in part what makes reducing carbon emissions so difficult. Affluence is linked to well-being but is a known driver of CO2 emissions (Rosa and Dietz 2012). Schnaiberg, Pellow, and Weinberg (2002, 23) write that reducing carbon emissions may be met with resistance because it questions the very logic of our economic system and the reliance on growth. However, some have questioned the logic of this system in the face of global environmental threats and vast inequalities in human well-being (e.g., Jackson 2009a, 2000b). Others have found evidence that calls into question the assumed tight coupling between levels of development and well-being (Brady et al. 2007).

A need for a better understanding of the connection between economic development, environmental demands, and well-being has led to a growing body of research on the carbon intensity of well-being (CIWB). This research analyzes variation across and within nation-states regarding how carbon intensely nation-states are producing well-being for their citizens, simultaneously capturing both human and environmental aspects of sustainability. This research is in line with calls for moving away from simply equating level of economic development with well-being in cross national analyses (Costanza et al. 2014; Easterlin 1974). It is also in line with increasing awareness and desire for action regarding both environmental contributions to well-being and the threats to well-being that environmental change may pose (Costanza et al. 1997; Liu et al. 2007a, 2007b; Rockstrom 2009a, 2009b; Roberts and Parks 2007a).

A key contribution of this project is to examine how global integration matters to the CIWB of nation-states. Nation-states and within-nation-state outcomes are not only shaped by dynamics within the country, they are also shaped by the global system and external forces (Chase-Dunn 1998). Comparative international sociological theories of global integration can help inform inquiry into the CIWB. In Chapter 2 I engage a well-known sociological theory, world society, or world polity theory, to see if this type of global integration affects real outcomes in terms of the CIWB of nations over time. In this chapter, Chapter 3, I assess, in a similarly focused way, how sociological approaches regarding world economic integration in terms of trade and trade relationships help explain changes in the CIWB within nations over time, and I test theoretically derived propositions suggested by the political economic theory of ecologically unequal exchange.

Research on the Carbon Intensity of Well-Being

Research into the ecological or carbon intensity of well-being can be loosely categorized into several separate but overlapping groups of scholars and approaches. In a key article in the first group, Dietz, Rosa and York (2012) create the combined and adjusted ratio measure of ecological intensity of well-being that is adopted by other scholars (e.g., Jorgenson 2014; Jorgenson and Dietz 2014) and used in this project. The authors look at the environmental intensity with which nation-states produce well-being for citizens in a test of the environmental Kuznets curve (EKC) hypothesis. Kuznets (1955) posited that economic growth within a society first increases inequality but then after reaching a turning point decreases inequality. This concept is frequently applied to environmental impacts with the EKC approach (Dinda 2004, 2005; Grossman and Krueger 1995; Stern 2004). Dietz et al. (2012) point out that this reliance on the growth approach to solve problems from inequality to environmental degradation within societies is a conventional view, but that questioning the reliance upon growth is increasingly common. This also creates the need for more direct measures of well-being, rather than using level of economic development as a proxy (Costanza et al. 2014; Dietz et al. 2012; Easterlin 1974; Jackson 2009a, 2009b; Sen 1999). Dietz et al. (2012) treat both income and consumption of environmental resources as factors in the production of well-being, and operationalize environmental intensity as the ecological footprint per capita and well-being as life expectancy at birth. They create a cost-benefit ratio, where environmental degradation is the cost and human well-being is the benefit, to create the concept of the environmental intensity of well-being (EIWB). The authors then test the proposition that growth is desirable. If growth is desirable it may initially increase the EIWB, but then it should ultimately decrease it. The authors, however, do not find evidence of a Kuznet's inverted "U" type relationship between the affluence of a nation and the stress it places on the environment. The authors also discuss the use of ratio measures such as carbon intensity or energy intensity, often employed in both policy discussions and research (e.g., Jorgenson and Clark 2012; Roberts and Parks 2007a). The creation of the EIWB builds upon previous work that reconceptualizes sustainability as the relationship between well-being and environmental impacts (Dietz, Rosa, and York 2009), looks at drivers of ecological impacts such as the ecological footprint (Dietz, Rosa, and York 2007; Jorgenson and Clark 2011), and CO2 emissions (Rosa and Dietz 2012; Jorgenson and Clark 2012), and looks at the relationship between energy consumption and quality of life (Mazur and Rosa 1974; Mazur 2011). These concepts have also inspired related streams of research looking at environmental efficiency of well-being using subjective measures (Knight and Rosa 2011) and other research that looks at temporal variation in the relationship between life expectancy and ecological footprint per capita (Knight 2014) in which the author finds a decoupling between life expectancy and environmental demands in more developed countries and finds mixed results in less developed countries

Another group of researchers look at the relationship between environmental impacts and human needs using a slightly different approach and different methods. Steinberger and Roberts (2010) find that only moderate levels of energy use and CO2 emissions are necessary to attain high quality human development and that achieving human well-being is becoming more efficient through time. Employing the human development index (HDI), composed of life expectancy, literacy, and income, they find a decoupling of per capita energy and carbon from human needs above a minimum threshold, and find that improvements in some indicators, such as literacy, require even lower energy and carbon levels than other well-being indicators. Their evidence calls into question the assumption that high energy consumption is necessary for high levels of well-being and challenges a relentless quest for growth, and it supports calls for a contraction and convergence approach (Global Commons Institute 2003). Steinberger and Roberts (2010) advocate for government strategies and market incentives to structure consumption restraint and global distribution and to prevent Jevon’s paradox/rebound effects that result when efficiency is outpaced by growth in consumption (Clark and Foster 2001). They also caution that voluntary reduction by nations that have high levels of emissions will be difficult because it goes against a growth driven economic system, and they warn that taking trade via consumption based measures of CO2 emissions into account could significantly alter the country trajectories they find. They explore this in another piece of research. Utilizing consumption based emissions created by Peters et al. (2011; Peters and Hertwich 2008), Steinberger et al. (2012) account for trade relationships in their analysis of human development, discussed in more detail below. Drivers of these consumption based measures of carbon emissions are also analyzed and compared to production based measures of carbon emissions (Dietz and Jorgenson 2014; Knight and Schor 2014; Lamb et al. 2014).

Building on the approach set forth by Dietz et al. (2012), Jorgenson and scholars advance research on the relationship between economic growth and the ecological intensity of well-being (Jorgenson and Dietz 2014), the carbon intensity of well-being (Jorgenson 2014), and the energy intensity of well-being in Central and Eastern European nations (Jorgenson et al. 2014). Each of these studies looks at the relationship between economic growth and the ratio of environmental stress to human well-being. The key emphasis in these three studies is examining the effect of economic growth on the dependent variable through time. Findings include that in developed countries economic growth has increased the EIWB, whereas in developing countries although it initially reduced the EIWB it now has a null effect. If this trajectory continues it implies that growth will also increase the EIWB in developing countries in the coming years unless policies that counter the negative environmental effects of growth are put into place

(Jorgenson and Dietz 2014). Regional analysis of the CIWB adds more nuance to the understanding of the impact of economic growth on the CIWB. It revealed that only in Africa did economic growth reduce the CIWB, and only in the early years of the 1970-2009 time period examined, whereas in developed regions it remained stable but high, and in developing regions in Asia and Latin America it has been positive and increased in magnitude through time (Jorgenson 2014). One region that is excluded from this analysis is Central and Eastern Europe, but results for this region for a shorter time period indicate a varying relationship between growth and the energy intensity of well-being, with some suggestion of more sustainable relationships (Jorgenson et al. 2014). In a related piece Jorgenson and Givens (unpublished manuscript under review) use similar methods to look at the effect of economic growth over time on the CIWB of nations using the consumption based measure of CO2 emissions.

CIWB and Trade

Literature that looks at the CIWB of nations has previously emphasized global inequality and much of the research has focused on the role of economic development and growth. Understanding the role of trade in the CIWB of nations is gaining increasing attention. In terms of global inequality, if inequality was diminished and resources were distributed equally, current levels of energy use and carbon emissions could meet human well-being needs at high levels (Steinberger and Roberts 2010). Yet global inequality plays a role in many social and environmental ills such as under consumption, which negatively impacts human well-being, and over consumption, which negatively impacts the environment (Jorgenson 2009; Jorgenson, Rice, and Clark 2010 2012; Rice 2007). This inequality obstructs international agreements at the nation-state level on curbing carbon emissions and other issues of global justice (Lamb et al. 2014; Roberts and Parks 2007).

Global economic integration and trade play a role in this inequality. For example, in terms of CO2 emissions it is generally found that trade reduces CO2 emissions in wealthier countries while increasing emissions in less affluent countries (Cole 2004; Rosa and Dietz 2012) and foreign investment dependence increases emissions in less affluent countries (Jorgenson 2007a, 2007b; Jorgensen 2009). Peters et al. (2011), in constructing consumption based CO2 emissions data, find that while growth in CO2 emissions has remained high globally, emissions in more developed countries have stabilized while emissions in less developed countries have doubled from 1990 to 2008 (see also Jorgenson and Clark 2012; Jorgenson et al. 2011). Declines in emissions may be due to the displacement of production emissions to less developed countries and increases in imports from less developed countries to more affluent countries. Peters et al. (2011) find that such trade is significant in explaining changes in country emissions levels over time.

Constructing consumption based emissions is one way to account for the impact of trade on the relationship between the environment and well-being within nations in the global economy. Steinberger et al. (2012) analyze these consumption-based measures of CO2 emissions and find that high life expectancy is attainable in countries with varying carbon emissions; however, high income is associated with high emissions, leading to a critical assessment of growth-based policies that ignore environmental impacts. The authors also find the consumption based measures more accurately account for the links between environmental impacts and well-being because the production based measures incorrectly make it seem that higher income countries may be dematerializing, whereas the consumption based measures show that the environmental impacts are likely being displaced to lower income countries via trade. Lamb et al. (2014) note that there are different pathways to human development, some of which do not involve high levels of CO_2 emissions, and in a cross sectional analysis the authors compare the effect of economic, demographic, and geographic factors on both the production and the consumption measures of CO_2.

Theoretical Perspectives on the Global Organization of Production

Another way to explore the role of economic integration and trade on environmental and human well-being outcomes is to engage theoretical perspectives from comparative international sociology that draw attention to the importance of how nation-states are integrated into the global economic system (Chase-Dunn 1975, 1998; Chase-Dunn, Kawano and Brewer 2000; Firebaugh 1992; Kentor 2001; Kentor and Boswell 2003). The global organization of production has been theorized to lead to uneven outcomes regarding both environmental and human well-being, and research on the CIWB of nations offers a fruitful way to test theoretically derived propositions.

Specifically, the political economic theory of ecologically unequal exchange draws attention to historically and materially unequal relationships in the global system that create and perpetuate unequal levels of development, environmental degradation, and well-being (Hornborg 1998; Jorgenson 2006). From this perspective, the globally unequal distribution of environmental harms is structurally determined and dependent on what is traded and with whom in asymmetrical relationships where more developed countries are in an advantageous position compared to less developed countries. This theory adds an ecological perspective to Emmanuel's (1972) concept of unequal exchange, and draws upon Bunker's (1984, 1985; Bunker and Ciccantell 2005) attention to the unequal relationships involved in resource extraction, global trade, and development within nation-states and the unequal outcomes in terms of development and the environment (Hornborg 1998; Jorgenson 2006, 2012).

Unequal ecological exchange theory portrays a global economy characterized by an unequal flow of value to higher income nations and the externalization of environmental degradation to lower income nations. The global organization of production is theorized as a way for more developed nations to gain unequal access to resources and at the same time to outsource their undesirable industries and environmental harms to less developed nations via a mechanism referred to as environmental load displacement (Hornborg 2009). This can result in a situation known as the consumption/degradation paradox where although more developed countries consume more resources, they experience less environmental degradation within their borders (Jorgenson 2003; Jorgenson et al. 2009). This paradox can also result in fewer challenges to the status quo because those having the most negative impact on the environment via their high levels of consumption can be somewhat removed from the negative environmental consequences of their actions. In this unequal relationship less developed nations are treated as a tap from which to derive resources and a sink for the consequent wastes and environmental harms (Andersson and Lindroth 2001; Jorgenson 2012; Rice 2007a, 2007b). The concept of the Netherlands Fallacy also refers to this global relationship, pointing out that it is a fallacy to assume the quality of life in the Netherlands is achieved without placing any environmental burdens outside of the country (Rice 2007b). Each of these concepts highlights the importance of the global economic integration of nation-states on related well-being and environmental outcomes within nation-states. There is a rich tradition of looking at these dynamics (see also Hornborg, 2001, 2006, 2007; Hornborg et al. 2007; for related work see Freudenburg 2005; Frickel and Freudenburg 1996; Frey 2006).

One mechanism by which this globally unequal relationship is constructed is captured by the concept of the pollution haven, which posits that the global system of trade encourages nation-states in less advantageous positions to pursue a comparative advantage in export oriented production in dirtier industries; these nations thus strategically or unintentionally become pollution havens (Leonard 1988). From the neoliberal perspective, export oriented production and pursuing a country's comparative advantage in an uneven global economy are logical strategies (Gilpin 2001). Other perspectives see such strategies as being encouraged by the globalization project that maintains the status quo system of inequality (McMichael 2008). McMichael (2008) is highly critical of this neoliberal era which he calls the "globalization project" (21); under the neoliberal era there is an emphasis on export oriented growth for less developed countries, globally oriented free trade policies, and rhetoric supposedly promoting a decreased role of the state to minimal functions of facilitating market transactions. Clapp and Dauvergen (2011, 169) explain that market liberals claim a pollution halo occurs where foreign direct investment leads to a decrease in pollution because of the transfer of technologies; others claim globalization of production can increase economic growth, technological advancement, and efficiency in less-developed countries through technological spillover effects, which may actually lead to improved well-being and reduce environmental harms (Cole 2004; Cole, Elliot, and Strobl 2008; Mol 1997, 2001, 2002). Perkins and Neumayer (2009), however, test hypotheses regarding the beneficial effects of such global economic linkages for less developed countries. They find evidence that eco-efficient technologies will not necessarily transfer from the core elsewhere because of the inherently unequal structure of the system, contra the pollution halo hypothesis, and caution against unjustified optimism. Research has analyzed the impact of unequal global economic integration on various environmental harms, including carbon emissions of nations (Jorgenson 2011, 2012; Givens and Jorgenson 2014; Roberts and Parks 2007a, 2007b, 2009), ecological footprints (Andersson and Lindroth 2001; Jorgenson 2009SF; Jorgenson and Clark 2009, 2011), biodiversity loss (Shandra et al. 2009b), deforestation (Shandra et al. 2009a; Jorgenson 2006, 2010; Jorgenson et al. 2009), and water pollution (Shandra et al. 2009c; Jorgenson 2009b). Such research generally finds support for propositions from ecologically unequal exchange theory. Stretesky and Lynch (2009) look specifically at CO2 emissions driven by trade with the U.S. and note the role of U.S. consumption in global carbon emissions.

In terms of human well-being, empirical research suggests the vertical flow of material value suppresses resource consumption within populations of the less-developed countries, with negative human well-being outcomes (Jorgenson 2009b, 2009c; Jorgenson and Clark 2009, 2011; Jorgenson and Rice 2005; Rice 2007a, 2008). Despite the neoliberal market based recommendations for development via relying on global economic integration via export oriented production and attracting foreign direct investment, these unequal global relationships, combined with parallel relations of labor exploitation, have been found to produce unequal levels of capital accumulations and high levels of global inequality between nations (Jorgenson and Rice 2012; Mahutga 2006) and to perpetuate a lack of development in low income countries (Jorgenson 2012; McMichael 2008). This under consumption can lead to negative health outcomes such as increased maternal mortality (Rice 2008), and infant mortality linked to water pollution (Jorgenson 2009b). Political economic theories draw attention to global inequality and scholars test the ability of global economic integration to remedy underdevelopment, often finding it is a more stable and inherent feature of the global system (Frank 1979; Mahutga 2006). While exports have shifted to less developed countries, in line with neoliberal proscriptions, trade remains unbalanced and disadvantages poorer nations as they export products to wealthier nations in a system where the value of the products does not capture the true social and environmental costs of their extraction, production, or transport (Roberts and Parks 2009).

Newer research in ecologically unequal exchange builds on a tradition of research into the well-being effects of economic integration and trade relationships. For example, London and Williams (1990), Wimberley (1990), and Wimberley and Bello (1992) find harmful effects of economic integration on well-being in less developed countries, while Firebaugh and Beck (1994) do not find evidence of dependence and instead find that economic growth brings benefits for national welfare. In a more recent key piece of research on well-being, Brady, Kaya, and Beckfield (2007: 1) take the 1994 Firebaugh and Beck article as a starting point to reassess the effect of growth on well-being in less-developed countries and their findings call the “growth consensus” into question. They find that while GDP has a significant effect on life expectancy, both male and female, and caloric consumption, it does not have robust effects on infant and child survival rates, and that other factors that policies could directly target have a larger effect than GDP, including fertility, urbanization, and secondary school enrollment. Other studies also question the link between well-being and level of development or economic growth. R. Clark (2011) finds economic growth contributes to global convergence in life expectancy and divergence in infant mortality. Mazur (2011) finds that in industrial nations, increases in energy consumption are not associated with corresponding quality of life improvements.

Political economic theoretical perspectives suggest that while trade openness may or may not decrease nations' CIWBs, unequal relations of exchange will likely increase nations' CIWBs as well-being is suppressed while environmental harms such as CO2 emissions are increased. I test the following hypothesis: Unequal relations of trade, in line with ecologically unequal exchange theory and indicated by percentage of exports to high income countries, will be associated with higher CIWB.

Research Design

As in Chapter 2, the data used in these analyses are for a sample of 81 countries with yearly data from 1990 to 2011. I estimate models for the entire sample of 81 countries, and also for a split sample of 52 nonhigh income countries and 29 high income countries. I also estimate models for a sample of 25 OECD countries and a sample of 16 countries with the lowest CIWB. In other words, those countries that are said to fall into the Goldemberg corner of relatively high life expectancy with relatively lower emissions, in addition to multiple other sensitivity analyses that involve various other groupings of countries and exclusion of outliers (Goldemberg et al. 1985).

In terms of global coverage, these 81 nations represent 85% of the world's population based on population data from 2011 (World Bank World Development Indicators. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). According to the World Bank's country and lending groups classification, in my sample I have 39% of countries classified as high income, and regionally in terms of "developing" countries the data contain 43% of Sub-Saharan African nations, 50% of nations in Latin America and the Caribbean, 19% of nations in Europe and Central Asia, 38% of nations in Asia, and 23% of nations in the Middle East (World Bank. http://data.worldbank.org/about/country-and-lending-groups. Accessed September 4, 2014). The 81 countries represent countries for which I was able to obtain a perfectly balanced data set, i.e., no missing data, with minimal imputation. I imputed Germany INGO for 1990, in addition to cleaning a few obvious typos in the data on INGOs for one year each for the following countries: Germany, Greece, Ireland, Italy, Netherlands, Poland, and Portugal. Table 1 includes the countries included in the analyses.

In this chapter I focus on one version of the CIWB as the dependent variable, the *production*-based carbon emissions per capita divided by *life expectancy*. Since I am looking at the impact of global economic integration using trade data on exports, in this chapter I focus on the production-based CIWB measures because the consumption based measures are created by adjusting production based measures using trade data. As in the first chapter, the data for the production-based carbon dioxide emissions (CO2) come from the World Resources Institute's CAIT 2.0 climate data explorer (Available at www.cait2.wri.org. Accessed August 2, 2014). The CAIT CO2 emissions data includes CO2 emissions from energy and cement manufacture but excludes emissions from land use change and forestry. The creators of the CAIT aim to produce a comprehensive data set that is comparable over time. To create the most accurate, complete, and comparable data the CAIT uses data from multiple sources including the Carbon Dioxide Information Analysis Center (CDIAC), the International Energy Agency (IEA), the UNFCCC from official country submissions, and the U.S. Energy Information Administration (EIA). These CO_2 emissions measures are used in cross national comparative research (Jorgenson and Clark 2012, 2010; Jorgenson, Clark, and Kentor 2010) and are highly correlated with other commonly used sources for CO_2 emissions data such as those from the World Bank. For the 81 countries included in my analyses the two measures are correlated at .99, however, I chose to use the WRI's CAIT data because it was updated through 2011.

The CO_2 emissions data are provided in millions of metric tons. Therefore, I used population data from the World Bank (World Bank World Development Indicators. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014) to convert total emissions data into per capita measures in metric tons so that both parts of the CIWB ratio are composed of averages: average CO_2 emissions per person and average life expectancy per person.

The data for life expectancy come from the World Bank World Development Indicators (Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). Life expectancy is total life expectancy at birth, or the total number of years an infant would be expected to live if patterns of mortality at the time of its birth remained the same throughout its life, in line with all other published research in this area

(Dietz, Rosa, and York 2012; Jorgenson 2014; Jorgenson and Dietz 2014). Table 2 provides descriptive statistics and variable correlations.

The dependent variable, the carbon intensity of well-being (CIWB) is a ratio dependent variable. In order not to have either the numerator or the denominator have a disproportionate influence on the ratio, I take the same approach as others analyzing the CIWB (Dietz et al. 2012; Jorgenson 2014; Jorgenson and Dietz 2014) and constrain the coefficients of variation, the standard deviation over the mean, to be equal by adding a constant to the CO2 measure. This shifts the mean without changing the variance. The coefficient of variation for production based CO2 is 1.1119 and for life expectancy it is 0.1544. Thus, I add the constant 28 to the production-based carbon emissions per capita, divide by life expectancy, and multiply by 100 to scale the ratio. Thus, using the first dependent variable as an example, the CIWB measure is:

$$CIWB = [(CO2pc + 28) / LE] * 100$$

In all of the models I control for level of economic development as GDP per capita, in constant 2005 U.S. dollars (World Bank. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014) and logged to minimize positive skew. This is the factor that most research in this area has examined, usually finding that level of development increases both CO2 (Jorgenson 2012; Jorgenson and Clark 2012) and CIWB or similar measures (Jorgenson 2014; Jorgenson and Dietz 2014).

The first key variable of interest is exports as a percent of GDP, which represents the value of all goods and other market services provided outside the nation-state, including "merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services" (World Bank. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). I also log this variable to minimize positive skew. This variable is often included as a control for a country's integration into the world economy. It also allows me to assess the hypothesis derived from ecologically unequal exchange theory, that the vertical flow of exports from lower to higher income countries increases CO2 emissions while suppressing well-being in lower income countries, while controlling for overall level of exports (Jorgenson 2012; Kentor 2001). Trade has been found to increase carbon emissions unequally, either increasing or reducing emission in more developed countries but increasing emissions in less developed countries (Rosa and Dietz 2012; Peters et al. 2011). I expect this form of global economic integration will be associated with increases in both CO2 emissions and life expectancy.

The main variable of interest is exports to high-income economies as a percent of total merchandise exports (World Bank. Available at http://databank.worldbank.org/data/home.aspx. Accessed July 24, 2014). For this variable economies are classified according to the World Bank classification of economies, which is also what I use in this project to classify nation-states (World Bank. http://data.worldbank.org/about/country-and-lending-groups. Accessed September 4, 2014). This is the commonly used measure to assess this relationship (Jorgenson 2012) and it is also highly correlated with the weighted export flows measure used in earlier studies (Jorgenson 2006, 2009; Jorgenson and Rice 2005). Exports to high income countries and asymmetric trade relations have been found to increase emissions in less developed countries while simultaneously suppressing well-being. Thus, I expect to find that exports to high income countries increases the CIWB of nations, especially nonhigh income nations. Table 15 includes summary statistics and Table 16 includes correlations for the variables.

To analyze the effects over time of theoretically derived independent variables on countries' carbon intensity of well-being I estimate Prais-Winsten models with panel-corrected standard errors (PCSE). This is an appropriate method for dealing with comparative international time series cross sectional data where data often have the structure of 10 to 100 units observed over 20 to 50 years and where errors may be serially (i.e., temporally) correlated, spatially (i.e., contemporaneously) correlated, and characterized by heteroscedasticity (all the error processes may not have the same variance) (Beck and Katz 1995). Beck and Katz (1995) advocate for this method as more appropriate than other methods such as the feasible generalized least-squares estimator (FGLS). This method can underestimate variation in the data and thus understate standard errors of the estimated coefficients, leading to over-confidence and increasing the chances of making type 1 errors. While OLS estimates of model parameters often perform well and yield coefficients that are consistent across methods, their estimates of standard errors are often inaccurate (Beck and Katz 1995; Wooldridge 2007 p427, 431). The method suggested by Beck and Katz (1995) and employed here retains OLS parameter estimates but uses panel corrected standard errors, which deal with spatial correlation and heteroscedasticity while the Prais-Winston transformation corrects for AR1 / serial correlation. I include country-specific and year-specific intercepts, making the model equivalent to a two-way fixed effects model. These intercepts allow me to control for and examine country-specific and year-specific effects. As with a fixed effects model, this technique estimates effects within countries over time rather than between countries and controls for variation between countries. This model construction is especially well-suited to hypothesis testing as it controls out all period-specific and country-specific variation. For this reason models are parsimonious and only control for level of development and the economic integration variable of interest, and one of the two economic integration variables interacted with time, to analyze the impact of the variable on the CIWB and change in the effect of the independent variable on the CIWB over time. All variables in the models are logged, thus estimated coefficients are elasticity coefficients where a 1 percent change in the independent variable leads to an estimated percent change in the dependent variable equal to the coefficient for that independent variable.

An example of an estimated model is as follows:

$$CIWB_{it} = B_1 GDP\ per\ capita_{it} + B_2 EXPGDP_{it} + B_3 year1991_t + \ldots + B_{23} year2011 +$$
$$B_{24} EXPGDP_{it} * year1991_t + \ldots + B_{44} EXPGDP_{it} * year2011_t + u_i + e_{it}$$

The dependent variable, $CIWB_{it}$, is the ratio of: production-based carbon emissions per capita to life expectancy. Each model includes GDP per capita, $B_1 GDP\ per\ capita_{it}$, as a control variable, the year specific intercepts, $B_3 year1991_t + \ldots + B_{23} year2011$, the country specific intercepts, u_i, and the error term for each country for each time point, e_{it}. The second model controls for the first independent variables of interest, exports as a percent of GDP, as indicated in the model above, $B_2 EXPGDP_{it}$, and the interactions between this variable of interest and the dummy variables for each year, $B_{24}EXPGDP_{it} * year1991_t + \ldots + B_{44}EXPGDP_{it} * year2011_t$. The coefficient for *EXPGDP* indicates that a 1 percent change in *EXPGDP* leads to a percent change in the carbon intensity of well-being equal to the coefficient for *EXPGDP* in the reference year, in this case 1990. For the other time points, the effect, if significant, is the sum of the coefficient for *EXPGDP* and the coefficient for the interaction term; if the interaction term is not significant the coefficient is the same as the reference year. In the case of a nonsignificant effect for the reference year, but a later significant interaction with time, the reference year is interpreted as being not significantly different than zero. I also conduct multiple sensitivity analyses including running models with lagged emissions and well-being measures, running the models on the two components of the CIWB separately, and running models with multiple other control variables to check for underspecified models.

Results and Discussion

Tables 17 through 21 report the findings for the estimated elasticity models for the production based carbon intensity of well-being, using life expectancy as the indicator of well-being, for each of the five samples of nations, all 81 nations, 52 nonhigh income nations, 29 high income nations, 16 nations with low CIWBs, and 24 OECD nations. The number of observations included in each group in all of the models in these tables equal the number of countries included multiplied by 22 since in these models I have perfectly balanced panel data sets and 22 time points. Although I do not report r-square statistics, the r-square statistic never falls below .9961 in any of the estimated models. Such high r-square statistics are due to unreported country specific and year specific intercepts, (equivalent to two-way fixed effects) and are consistent with other research employing similar methods (Jorgenson and Clark 2013). I conduct two-tailed tests of statistical significance. As in Chapter 2, all variables in the models are logged, thus estimated coefficients are elasticity coefficients where a 1 percent change in the independent variable leads to an estimated percent change in the dependent variable equal to the coefficient for that independent variable. Thus, for example, in the sample of all 81 countries in 2001 a 1 percent increase in exports as a percent of GDP led to a .001 percent increase in CIWB.

Figures 19 and 20 graphically depict the elasticity coefficients in Tables 17 through 21. These graphs of the elasticity coefficients indicate how the effect of the independent variable on the CIWB has changed over time, for each of the groups of countries, and the height of the bar indicates the magnitude of the effect. To arrive at the elasticity coefficients I first determine if the baseline year is statistically significant. If it is, the coefficient for each year is the sum of the baseline year coefficient and the coefficient for the year's interaction effect if the interaction effect is significant; if the interaction effect is not significant, the coefficient for that year is the same as the coefficient for the baseline year. If the main effect is not significant, I assume this means the effect does not differ significantly from zero. Thus, if the interaction effect of the variable with the year is significant, the elasticity coefficient is simply equal to the coefficient for the interaction effect. If the interaction effect is also not significant, in other words neither the main effect nor the interaction effect is significant, the elasticity coefficient is equal to zero.

The results for the first variable of interest, exports as a percent of GDP, illustrate that while the main effect for exports is negative in the overall sample and in the samples of nonhigh income countries and the 16 countries with the lowest CIWBs, we see that the effect of exports is becoming increasingly less negative in time, becoming positive for the overall sample in 2001. This indicates that while global economic integration was having a negative, i.e., desirable effect on the CIWB, there may have been a shift in the early 2000s to where this was no longer the case and global economic integration began increasing countries' CIWBs. From the graph in Figure 19, we can see that this trend applies to both the nonhigh income countries and the 16 countries with the lowest CIWBs. However, we can see that exports as a percent of GDP continued to decrease the CIWB for high income countries and OECD countries.

Turning to the second variable of interest, percent of exports to high income countries, the key variable used to test propositions from the theory of ecologically unequal exchange, we can see in Figure 20 that we have fewer significant findings, nonsignificant findings being indicated by the absence of bars in the graph, but we again see evidence of varying effects of global economic development based on level of development. Beginning in about 2006 we can see that exports to high income countries is increasing the CIWB of nonhigh income countries. For the 16 countries with low CIWBs, none of which are high income countries, we see a similar result from 1994 to 2002; unequal relationships of trade, captured by the variable percent of exports to high income countries, increases the CIWB for these 16 countries. On the other hand, sending exports to high income countries appears beneficial for other high income countries, decreasing their CIWB, for most of this time period, although for the OECD countries in particular the results are generally nonsignificant.

These results for both general global economic integration, represented as exports as a percent of GDP, and asymmetric economic integration, represented as exports to high income countries, show evidence of disproportionate benefits that accrue in terms of nations' CIWBs based on an advantageous position in the global economy and ecologically unequal trade. The trend of increasing CIWBs for the less developed countries illustrates the disproportionate disadvantage lower-income countries face in terms of global economic integration. Furthermore, this form of global economic integration is becoming increasingly unsustainable over time, as it increases the CIWB within nonhigh income nations. As noted above, I also conduct multiple sensitivity analyses, available upon request, including running models with lagged emissions and well-being measures, running the models on the two components of the CIWB separately, and running models with multiple other control variables to check for underspecified models. Results are generally very consistent, none of the results changed substantively. Higher lagged CO2 emissions per capita increase the CIWB, whereas higher lagged life expectancy decreases the CIWB. I also ran the analyses on the two components of the CIWB separately, also available upon request. While none of the findings were especially surprising, they illustrate the value of the CIWB measure. Constraining the coefficient of variation when constructing the CIWB ratio prevents either the numerator or the denominator from overly driving the ratio across the analyses; as a result the CIWB indicates something more meaningful than the sum of its parts. While not perfect, the CIWB simultaneously captures both social and environmental sustainability in a way that can be compared cross nationally and across time, and is a useful tool in advancing our understanding of environmental and social global sustainability.

Conclusion

In this chapter I examined the effect of global economic integration on the CIWB of nations over time and I tested a theoretically derived hypothesis drawn from the political economic theory of ecologically unequal exchange. This theoretical perspective posits that asymmetric trade relationships foster the vertical flow of value from less to more developed nations, which results in disproportionate access to resources in more developed nations and suppresses well-being in less developed nations (Bunker 1984; Hornborg 1998, 2009; Jorgenson 2006, 2012; Rice 2007, 2009; Roberts and Parks 2009; Shandra et al. 2009a, 2009b, 2009c).

The direct test assessing the effect of exports to high income countries on the CIWB yielded some evidence of such relationships, especially from 1994 to 2002 for the 16 countries with the lowest CIWBs, and from 2006 to 2011 for the sample of nonhigh income countries. Additionally, the trend in global economic integration indicated by exports as a percent of GDP indicates uneven results for more versus less developed countries. Global integration appears to be reducing the CIWB of more developed nations, and this relationship has remained stable through time. However, economic integration indicated by exports as a percent of GDP may have been reducing the CIWB of nations in the 1990s; however, it is decreasingly reducing the CIWB of less developed nations, which is also in line with the theoretical proposition of ecologically unequal exchange and previous research on how trade impacts CO_2 emissions of countries at different levels of development (Peters et al. 2011; Steinberger et al. 2012; Jorgenson and

Clark 2012). If this trend of global economic integration becoming increasingly unsustainable for lower income countries continues, we may even see a situation where the CIWB, which has been decreasing overall for the entire time period of the study, may begin to increase, which does not bode well for human or environmental well-being.

The findings here suggest many directions for future research. In addition to following the CIWB of nations and tracking the changing relationship of the CIWB of nations and global economic integration and unequal trade relationships over time moving forward, I would also like to extend the analysis back further into the past. Theorization and other empirical studies (McMichael 2008; Jorgenson 2012) suggest that the impact of unequal relationships of trade may be more pronounced if a longer time span is analyzed. A second direction for future research is to explore in more specific detail the impact of types of commodities that are traded and the trading partners involved on the CIWB. Although, quality cross national data that are comparative across countries and over time poses some challenges for research in this area. A related area for exploration is to examine what sectors from the economy CO2 emissions are attributable to, and to see how this is both impacted by global economic integration and how it impacts the CIWB. These data are available from the same source as the production based CO2 emissions data used in this paper and preliminary analyses suggest this is a fruitful avenue to pursue in future research. Other forms of economic integration could be explored, such as foreign capital penetration in various sectors, in line with previous research on foreign direct investment, development, and the environment (Alderson and Nielsen 1999; Grimes and Kentor 2003; Kentor and Boswell 2003; Kentor and Grimes 2006; Kentor and Jorgenson 2010; Jorgenson 2003, 2006, 2007, 2008, 2009a;

Jorgenson, Dick, and Mahutga 2007; Jorgenson et al. 2007; Jorgenson and Kuykendall 2008). Regional differences have proved explanatory (Jorgenson 2014) and thus intersections and also interactions between regional variation and various forms of global integration is something I plan to pursue in the near future. Other comparative international theoretical perspectives, such as theories of the state and state capacity (Evans, Rueschemeyer, Skocpol 1985; Evans and Stephens 1988; Krasner 2001, 2004; Mathews 1997; Nettl 1968; and see Knight and Rosa 2011 for an empirical test), militarization (Clark, Jorgenson, and Kentor 2010; Downey, Bonds, and Clark 2010; Givens 2014; Hooks and Smith 2004, 2005; Jorgenson and Clark 2009; Jorgenson, Clark, and Givens 2013; Jorgenson, Clark, and Kentor 2010; Kentor and Kick 2008; Pedersen 2002), and theories from urban political economy (Clark and York 2005; Jorgenson and Rice 2010, 2012; Jorgenson, Rice and Clark, 2010, 2012; Molotch 1976; York 2008) suggest other factors that may impact the CIWB and change in the CIWB of nations over time. These additional explanatory factors, including political characteristics of the state, military action and militarization, and characteristics of urbanization, should be explored. In some of the sensitivity analyses in which I run models with multiple other controls, some of these factors do seem to be of importance, and thus they warrant further exploration; however, they do not alter the main findings for the variables of interest in this study. Finally, although most CIWB research has concentrated at the level of the state, these analyses can be scaled down all the way to the individual level dependent on data availability, and creative research on the CIWB at smaller scales may yield useful insights. For example, while life expectancy is often used in comparative international analyses, smaller scale approaches make a range of well-being measures more applicable, including measures of subjective well-being (Knight and Rosa 2011). All of these suggestions could contribute to a greater understanding of the CIWB and could shed insight on directions forward for policy that would maintain or increase well-being while reducing the associated carbon or environmental intensity.

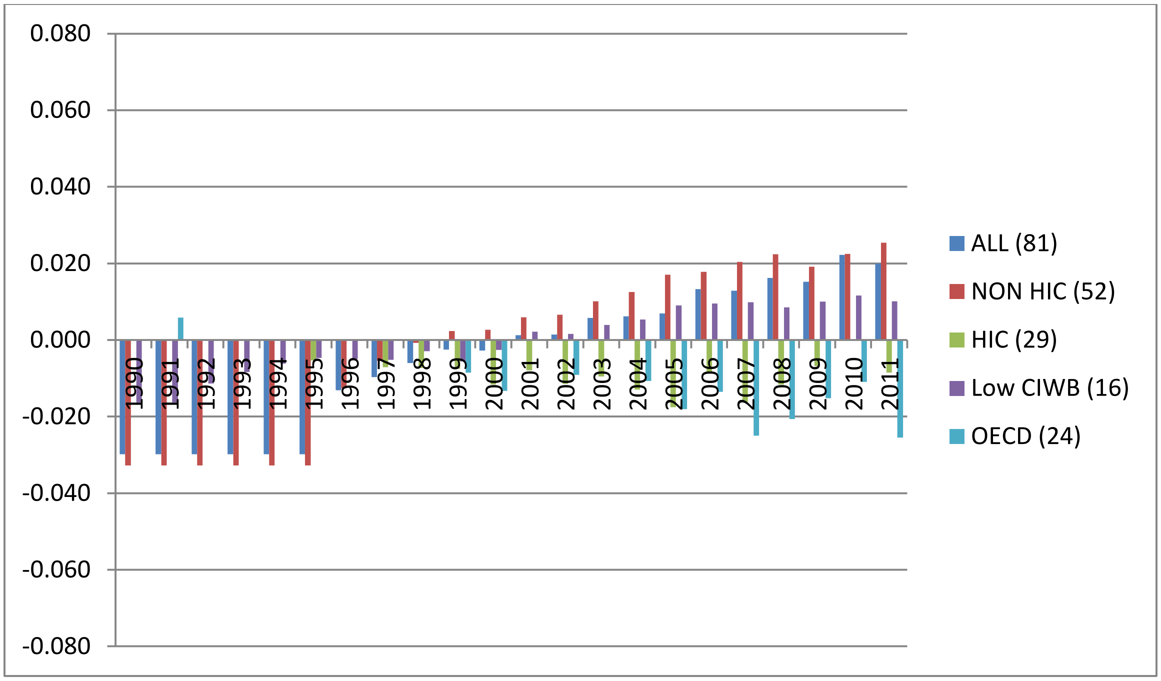

Figure 19 Elasticity Coefficients for the Estimated Effects of Exports as a Percent of GDP on Production-Based CIWB, 1990-2011

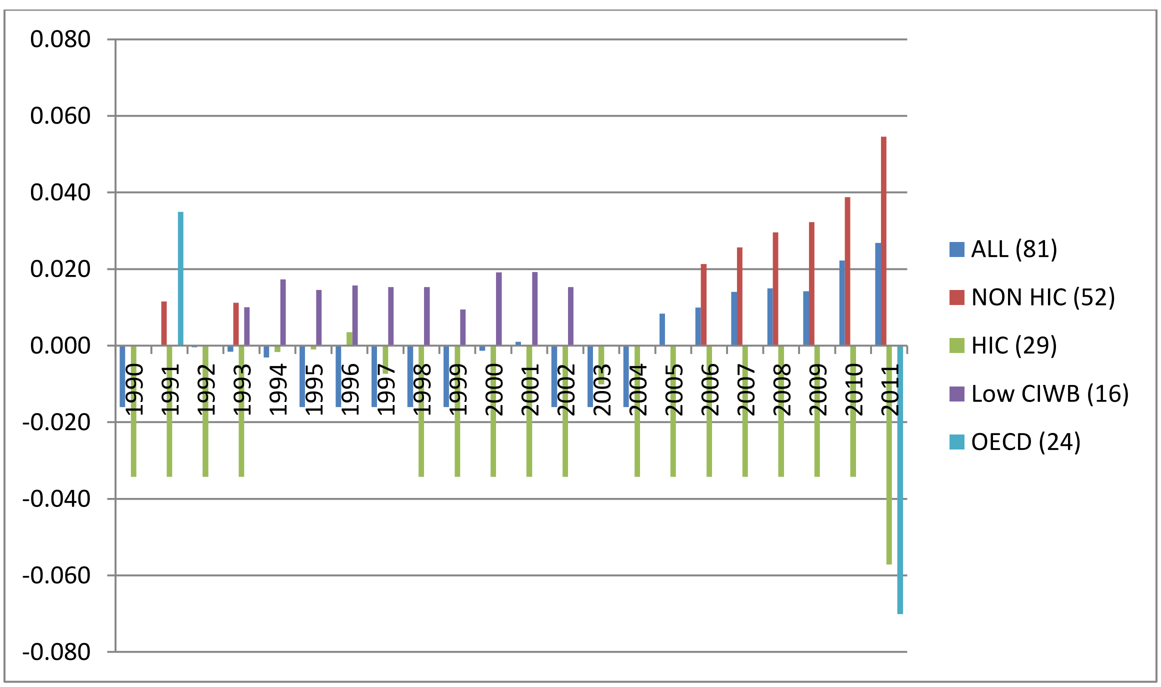

Figure 20 Elasticity Coefficients for the Estimated Effects of Exports to High Income Countries on Production-Based CIWB, 1990-2011

Table 15 Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
1. Production-based CIWB	1782	48.184	7.372	36.994	104.872
2. GDP per capita	1782	11,139.420	14,712.430	111.800	67,804.500
3. Exports as a percent of GDP	1782	35.070	25.390	3.200	230.300
4. Exports to high income countries	1782	70.706	18.192	7.400	97.400

Table 16 Correlations

	1	2	3
1. Production-based CIWB			
2. GDP per capita	0.022		
3. Exports as a percent of GDP	-0.024	0.222	
4. Exports to high income countries	-0.172	0.398	0.025

Table 17 Effect of Trade Integration and Trade Relationships on Production-Based CIWB, 81 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.033	(*)	0.0187	
Exports as a % GDP	-0.030	***	0.0061	-0.030
Exports as a % GDP X 1991	-0.002		0.0031	-0.030
Exports as a % GDP X 1992	-0.003		0.0044	-0.030
Exports as a % GDP X 1993	-0.001		0.0052	-0.030
Exports as a % GDP X 1994	0.001		0.0054	-0.030
Exports as a % GDP X 1995	0.008		0.0061	-0.030
Exports as a % GDP X 1996	0.017	*	0.0065	-0.013
Exports as a % GDP X 1997	0.020	**	0.0062	-0.010
Exports as a % GDP X 1998	0.024	***	0.0067	-0.006
Exports as a % GDP X 1999	0.027	***	0.0067	-0.002
Exports as a % GDP X 2000	0.027	***	0.0071	-0.003
Exports as a % GDP X 2001	0.031	***	0.0069	0.001
Exports as a % GDP X 2002	0.031	***	0.0079	0.001
Exports as a % GDP X 2003	0.036	***	0.0077	0.006
Exports as a % GDP X 2004	0.036	***	0.0070	0.006
Exports as a % GDP X 2005	0.037	***	0.0072	0.007
Exports as a % GDP X 2006	0.043	***	0.0070	0.013
Exports as a % GDP X 2007	0.043	***	0.0071	0.013
Exports as a % GDP X 2008	0.046	***	0.0069	0.016
Exports as a % GDP X 2009	0.045	***	0.0067	0.015
Exports as a % GDP X 2010	0.052	***	0.0070	0.022
Exports as a % GDP X 2011	0.050	***	0.0066	0.020

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.030		0.0204	
Exports as a % GDP	-0.013	**	0.0049	
Percent Exports to HIC	-0.016	**	0.0048	-0.016
Percent Exports to HIC X 1991	0.016	***	0.0033	0.000
Percent Exports to HIC X 1992	0.016	(*)	0.0090	0.000
Percent Exports to HIC X 1993	0.014	*	0.0064	-0.002
Percent Exports to HIC X 1994	0.013	(*)	0.0078	-0.003
Percent Exports to HIC X 1995	0.016		0.0100	-0.016
Percent Exports to HIC X 1996	0.018		0.0126	-0.016
Percent Exports to HIC X 1997	0.013		0.0129	-0.016
Percent Exports to HIC X 1998	0.012		0.0107	-0.016
Percent Exports to HIC X 1999	0.014		0.0100	-0.016
Percent Exports to HIC X 2000	0.015	(*)	0.0087	-0.001

Table 17 Continued

ALL (81)	Coefficient	Significance	PCSE	Elasticity Coefficient
Percent Exports to HIC X 2001	0.017	*	0.0080	0.001
Percent Exports to HIC X 2002	0.018		0.0134	-0.016
Percent Exports to HIC X 2003	0.024		0.0150	-0.016
Percent Exports to HIC X 2004	0.023		0.0165	-0.016
Percent Exports to HIC X 2005	0.024	*	0.0112	0.008
Percent Exports to HIC X 2006	0.026	*	0.0103	0.010
Percent Exports to HIC X 2007	0.030	**	0.0092	0.014
Percent Exports to HIC X 2008	0.031	***	0.0076	0.015
Percent Exports to HIC X 2009	0.030	***	0.0072	0.014
Percent Exports to HIC X 2010	0.038	***	0.0073	0.022
Percent Exports to HIC X 2011	0.043	***	0.0099	0.027
Number of Nations				81
Number of Observations				1782

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 18 Effect of Trade Integration and Trade Relationships on Production-Based CIWB, 52 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.020		0.0211	
Exports as a % GDP	-0.033	***	0.0089	-0.033
Exports as a % GDP X 1991	-0.004		0.0052	-0.033
Exports as a % GDP X 1992	-0.004		0.0073	-0.033
Exports as a % GDP X 1993	-0.003		0.0088	-0.033
Exports as a % GDP X 1994	0.001		0.0094	-0.033
Exports as a % GDP X 1995	0.010		0.0106	-0.033
Exports as a % GDP X 1996	0.020	(*)	0.0110	-0.013
Exports as a % GDP X 1997	0.027	**	0.0104	-0.005
Exports as a % GDP X 1998	0.032	**	0.0108	-0.001
Exports as a % GDP X 1999	0.035	**	0.0113	0.002
Exports as a % GDP X 2000	0.035	**	0.0115	0.003
Exports as a % GDP X 2001	0.039	**	0.0115	0.006
Exports as a % GDP X 2002	0.039	**	0.0134	0.007
Exports as a % GDP X 2003	0.043	**	0.0133	0.010
Exports as a % GDP X 2004	0.045	***	0.0121	0.013
Exports as a % GDP X 2005	0.050	***	0.0124	0.017
Exports as a % GDP X 2006	0.051	***	0.0117	0.018
Exports as a % GDP X 2007	0.053	***	0.0118	0.020
Exports as a % GDP X 2008	0.055	***	0.0115	0.022
Exports as a % GDP X 2009	0.052	***	0.0113	0.019
Exports as a % GDP X 2010	0.055	***	0.0120	0.022
Exports as a % GDP X 2011	0.058	***	0.0116	0.025

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.010		0.0239	
Exports as a % GDP	-0.013	*	0.0052	
Percent Exports to HIC	-0.008		0.0053	0.000
Percent Exports to HIC X 1991	0.012	**	0.0035	0.012
Percent Exports to HIC X 1992	0.017		0.0114	0.000
Percent Exports to HIC X 1993	0.011	(*)	0.0059	0.011
Percent Exports to HIC X 1994	0.006		0.0079	0.000
Percent Exports to HIC X 1995	0.008		0.0108	0.000
Percent Exports to HIC X 1996	0.007		0.0139	0.000
Percent Exports to HIC X 1997	0.006		0.0136	0.000
Percent Exports to HIC X 1998	0.005		0.0114	0.000
Percent Exports to HIC X 1999	0.005		0.0112	0.000
Percent Exports to HIC X 2000	0.006		0.0099	0.000

Table 18 Continued

NON HIC (52)	Coefficient	Significance	PCSE	Elasticity Coefficient
Percent Exports to HIC X 2001	0.008		0.0088	0.000
Percent Exports to HIC X 2002	0.008		0.0162	0.000
Percent Exports to HIC X 2003	0.011		0.0185	0.000
Percent Exports to HIC X 2004	0.013		0.0193	0.000
Percent Exports to HIC X 2005	0.017		0.0125	0.000
Percent Exports to HIC X 2006	0.021	(*)	0.0117	0.021
Percent Exports to HIC X 2007	0.026	*	0.0107	0.026
Percent Exports to HIC X 2008	0.030	**	0.0088	0.030
Percent Exports to HIC X 2009	0.032	***	0.0085	0.032
Percent Exports to HIC X 2010	0.039	***	0.0092	0.039
Percent Exports to HIC X 2011	0.055	***	0.0139	0.055
Number of Nations				52
Number of Observations				1144

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 19 Effect of Trade Integration and Trade Relationships on Production-Based CIWB, 29 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.129	***	0.0199	
Exports as a % GDP	0.001		0.0095	0.000
Exports as a % GDP X 1991	0.000		0.0015	0.000
Exports as a % GDP X 1992	-0.003		0.0020	0.000
Exports as a % GDP X 1993	-0.003		0.0022	0.000
Exports as a % GDP X 1994	-0.002		0.0025	0.000
Exports as a % GDP X 1995	-0.005	(*)	0.0028	-0.005
Exports as a % GDP X 1996	-0.003		0.0030	0.000
Exports as a % GDP X 1997	-0.007	*	0.0034	-0.007
Exports as a % GDP X 1998	-0.007	(*)	0.0040	-0.007
Exports as a % GDP X 1999	-0.008	*	0.0034	-0.008
Exports as a % GDP X 2000	-0.012	**	0.0034	-0.012
Exports as a % GDP X 2001	-0.008	*	0.0032	-0.008
Exports as a % GDP X 2002	-0.011	**	0.0034	-0.011
Exports as a % GDP X 2003	-0.010	**	0.0033	-0.010
Exports as a % GDP X 2004	-0.013	***	0.0034	-0.013
Exports as a % GDP X 2005	-0.018	***	0.0035	-0.018
Exports as a % GDP X 2006	-0.009	*	0.0036	-0.009
Exports as a % GDP X 2007	-0.016	***	0.0038	-0.016
Exports as a % GDP X 2008	-0.012	**	0.0038	-0.012
Exports as a % GDP X 2009	-0.007	(*)	0.0038	-0.007
Exports as a % GDP X 2010	0.000		0.0039	0.000
Exports as a % GDP X 2011	-0.009	*	0.0039	-0.009

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.128	***	0.0185	
Exports as a % GDP	-0.009		0.0103	
Percent Exports to HIC	-0.034	**	0.0118	-0.034
Percent Exports to HIC X 1991	0.001		0.0138	-0.034
Percent Exports to HIC X 1992	-0.001		0.0165	-0.034
Percent Exports to HIC X 1993	0.021		0.0164	-0.034
Percent Exports to HIC X 1994	0.033	*	0.0147	-0.002
Percent Exports to HIC X 1995	0.033	*	0.0145	-0.001
Percent Exports to HIC X 1996	0.038	**	0.0139	0.004
Percent Exports to HIC X 1997	0.027	(*)	0.0155	-0.007
Percent Exports to HIC X 1998	0.022		0.0156	-0.034
Percent Exports to HIC X 1999	0.019		0.0149	-0.034
Percent Exports to HIC X 2000	0.018		0.0156	-0.034

Table 19 Continued

HIC (29)	Coefficient	Significance	PCSE	Elasticity Coefficient
Percent Exports to HIC X 2001	0.017		0.0156	-0.034
Percent Exports to HIC X 2002	0.015		0.0147	-0.034
Percent Exports to HIC X 2003	0.024	(*)	0.0131	-0.010
Percent Exports to HIC X 2004	0.020		0.0126	-0.034
Percent Exports to HIC X 2005	0.010		0.0126	-0.034
Percent Exports to HIC X 2006	-0.010		0.0126	-0.034
Percent Exports to HIC X 2007	-0.007		0.0122	-0.034
Percent Exports to HIC X 2008	-0.018		0.0117	-0.034
Percent Exports to HIC X 2009	-0.019		0.0117	-0.034
Percent Exports to HIC X 2010	-0.010		0.0117	-0.034
Percent Exports to HIC X 2011	-0.023	(*)	0.0117	-0.057
Number of Nations				29
Number of Observations				638

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 20 Effect of Trade Integration and Trade Relationships on Production-Based CIWB, 16 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.053	***	0.0093	
Exports as a % GDP	-0.016	***	0.0035	-0.016
Exports as a % GDP X 1991	0.002		0.0012	-0.016
Exports as a % GDP X 1992	0.005	**	0.0017	-0.011
Exports as a % GDP X 1993	0.008	***	0.0018	-0.008
Exports as a % GDP X 1994	0.010	***	0.0021	-0.006
Exports as a % GDP X 1995	0.012	***	0.0023	-0.005
Exports as a % GDP X 1996	0.011	***	0.0024	-0.005
Exports as a % GDP X 1997	0.011	***	0.0024	-0.005
Exports as a % GDP X 1998	0.013	***	0.0025	-0.003
Exports as a % GDP X 1999	0.011	***	0.0030	-0.006
Exports as a % GDP X 2000	0.014	***	0.0029	-0.003
Exports as a % GDP X 2001	0.018	***	0.0032	0.002
Exports as a % GDP X 2002	0.018	***	0.0036	0.002
Exports as a % GDP X 2003	0.020	***	0.0042	0.004
Exports as a % GDP X 2004	0.022	***	0.0042	0.005
Exports as a % GDP X 2005	0.025	***	0.0037	0.009
Exports as a % GDP X 2006	0.026	***	0.0037	0.010
Exports as a % GDP X 2007	0.026	***	0.0036	0.010
Exports as a % GDP X 2008	0.025	***	0.0037	0.008
Exports as a % GDP X 2009	0.026	***	0.0037	0.010
Exports as a % GDP X 2010	0.028	***	0.0038	0.012
Exports as a % GDP X 2011	0.026	***	0.0040	0.010

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.071	***	0.0084	
Exports as a % GDP	-0.003		0.0029	
Percent Exports to HIC	-0.007		0.0052	0.000
Percent Exports to HIC X 1991	-0.001		0.0067	0.000
Percent Exports to HIC X 1992	0.006		0.0074	0.000
Percent Exports to HIC X 1993	0.010	(*)	0.0061	0.010
Percent Exports to HIC X 1994	0.017	*	0.0070	0.017
Percent Exports to HIC X 1995	0.015	*	0.0068	0.015
Percent Exports to HIC X 1996	0.016	*	0.0066	0.016
Percent Exports to HIC X 1997	0.015	*	0.0066	0.015
Percent Exports to HIC X 1998	0.015	*	0.0061	0.015
Percent Exports to HIC X 1999	0.009		0.0057	0.009
Percent Exports to HIC X 2000	0.019	**	0.0064	0.019

Table 20 Continued

Low CIWB (16)	Coefficient	Significance	PCSE	Elasticity Coefficient
Percent Exports to HIC X 2001	0.019	**	0.0071	0.019
Percent Exports to HIC X 2002	0.015	(*)	0.0085	0.015
Percent Exports to HIC X 2003	0.012		0.0089	0.000
Percent Exports to HIC X 2004	0.004		0.0102	0.000
Percent Exports to HIC X 2005	0.016		0.0117	0.000
Percent Exports to HIC X 2006	0.011		0.0115	0.000
Percent Exports to HIC X 2007	0.012		0.0089	0.000
Percent Exports to HIC X 2008	-0.001		0.0096	0.000
Percent Exports to HIC X 2009	0.000		0.0085	0.000
Percent Exports to HIC X 2010	0.011		0.0088	0.000
Percent Exports to HIC X 2011	0.002		0.0093	0.000
Number of Nations				16
Number of Observations				352

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

Table 21 Effect of Trade Integration and Trade Relationships on Production-Based CIWB, 24 Countries, 1990-2011
Elasticity Coefficients from Two-Way Fixed Effects Prais-Winsten Regression Models

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.113	***	0.0180	
Exports as a % GDP	-0.004		0.0104	0.000
Exports as a % GDP X 1991	0.006	*	0.0024	0.006
Exports as a % GDP X 1992	0.003		0.0030	0.000
Exports as a % GDP X 1993	0.004		0.0034	0.000
Exports as a % GDP X 1994	0.004		0.0037	0.000
Exports as a % GDP X 1995	-0.003		0.0040	0.000
Exports as a % GDP X 1996	0.004		0.0042	0.000
Exports as a % GDP X 1997	-0.005		0.0044	0.000
Exports as a % GDP X 1998	-0.006		0.0045	0.000
Exports as a % GDP X 1999	-0.008	(*)	0.0046	-0.008
Exports as a % GDP X 2000	-0.013	**	0.0047	-0.013
Exports as a % GDP X 2001	-0.007		0.0048	0.000
Exports as a % GDP X 2002	-0.009	(*)	0.0049	-0.009
Exports as a % GDP X 2003	-0.006		0.0050	0.000
Exports as a % GDP X 2004	-0.011	*	0.0051	-0.011
Exports as a % GDP X 2005	-0.018	**	0.0052	-0.018
Exports as a % GDP X 2006	-0.014	*	0.0055	-0.014
Exports as a % GDP X 2007	-0.025	***	0.0055	-0.025
Exports as a % GDP X 2008	-0.021	***	0.0056	-0.021
Exports as a % GDP X 2009	-0.015	**	0.0054	-0.015
Exports as a % GDP X 2010	-0.011	*	0.0053	-0.011
Exports as a % GDP X 2011	-0.026	***	0.0052	-0.026

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
GDP per capita	0.075	***	0.0143	
Exports as a % GDP	-0.017	(*)	0.0092	
Percent Exports to HIC	-0.064	0.198	0.0499	0.000
Percent Exports to HIC X 1991	0.035	(*)	0.0198	0.035
Percent Exports to HIC X 1992	0.021		0.0284	0.000
Percent Exports to HIC X 1993	0.038		0.0333	0.000
Percent Exports to HIC X 1994	0.048		0.0358	0.000
Percent Exports to HIC X 1995	0.024		0.0374	0.000
Percent Exports to HIC X 1996	0.059		0.0399	0.000
Percent Exports to HIC X 1997	0.015		0.0407	0.000
Percent Exports to HIC X 1998	0.020		0.0411	0.000
Percent Exports to HIC X 1999	0.008		0.0406	0.000
Percent Exports to HIC X 2000	-0.034		0.0410	0.000

Table 21 Continued

OECD (24)	Coefficient	Significance	PCSE	Elasticity Coefficient
Percent Exports to HIC X 2001	-0.019		0.0406	0.000
Percent Exports to HIC X 2002	0.000		0.0408	0.000
Percent Exports to HIC X 2003	0.022		0.0401	0.000
Percent Exports to HIC X 2004	-0.010		0.0396	0.000
Percent Exports to HIC X 2005	-0.021		0.0398	0.000
Percent Exports to HIC X 2006	-0.013		0.0397	0.000
Percent Exports to HIC X 2007	-0.034		0.0400	0.000
Percent Exports to HIC X 2008	-0.041		0.0401	0.000
Percent Exports to HIC X 2009	-0.036		0.0411	0.000
Percent Exports to HIC X 2010	-0.025		0.0415	0.000
Percent Exports to HIC X 2011	-0.070	(*)	0.0413	-0.070
Number of Nations				24
Number of Observations				528

Notes: *** p<.001, ** p<.01, * p<.05, (*) p<.1; PCSE = panel corrected standard errors

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